

PRESSURES FOR REFORM IN THE
EAST EUROPEAN ECONOMIES

VOLUME 1

STUDY PAPERS
SUBMITTED TO THE
JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES



OCTOBER 20, 1989

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1989

96-460

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LETTER OF TRANSMITTAL

SEPTEMBER 25, 1989.

To the Members of the Joint Economic Committee:

This study, entitled *Pressures for Reform in the East European Economies*, is for the use of the Joint Economic Committee, other Members of Congress, and the interested public. It is in two volumes and consists of papers prepared at the Committee's request by government and private experts from a large number of universities and research organizations.

The study examines recent economic performance and prospects in the East European countries, the pressures for fundamental reform, and the steps that have been taken in each country to facilitate or frustrate change. In addition, there are analyses of the problems of measuring economic performance in countries where official statistics are incomplete and sometimes misleading, profiles of the individual countries, and assessments of their defense sectors and foreign commercial relations.

The study was planned and edited by John P. Hardt and Richard F Kaufman. We are grateful to the Congressional Research Service of the Library of Congress for making Dr. Hardt and Sheila N. Heslin available to work on this project, and to the many authors who contributed papers to the study.

The views contained in the volumes are those of the authors and not necessarily those of the Joint Economic Committee or its individual Members.

Sincerely,

LEE H. HAMILTON,
Chairman.

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INTRODUCTION*

By John P. Hardt and Richard F Kaufman

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SUMMARY

Converging pressures for economic reform have been mounting in Eastern Europe. Most of the countries in the region are taking steps toward reform of one kind or another. Generally, two types of reform are possible, equivocal and comprehensive. *Equivocal reform* involves a step-by-step process in which reforms are introduced gradually and partially to deal with specific problems. Often these reforms are revised or reversed as the immediacy of a particular problem diminishes. *Comprehensive reform*, on the other hand, is defined as a process of systemic change in the economic, political, military, and social spheres. Comprehensive implies the necessity for change both across all areas and to a threshold which allows for systemic change that produces long-term efficiencies, higher standards of living, increased competitiveness, and integration into the global economy.

The experts who have contributed to these volumes share the view that while comprehensive reform is necessary to solve the underlying problems in the East European economies, so far no country has taken adequate steps to implement this approach. They base their analyses on the assumption present in what Ed Hewett

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refers to as the baseline projection: that systemic change in Eastern Europe has been and will most likely continue to be slow and equivocal.¹ Many East European reform economists are committed or resigned to the view that change is necessary, even inevitable because poor past performance, difficult present conditions, and a bleak future outlook leave East European policymakers without the choice of further equivocation but rather with the necessity to implement comprehensive reform.

In the past, barriers to change have prevailed over incentives for reform. Today, internal pressures for reform arise from increasingly discontented publics and expected changes in Brezhnev-era leaderships. In addition, there are external pressures for reform from the Soviet Union and from various Western nations and international economic organizations who have conditioned commercial policies toward Eastern Europe on progressive reforms. It is this unique convergence of internal and external pressures for reform—now stronger than at any time in the postwar period—that might change the outlook.

Both equivocal and comprehensive reform have been considered in assessing the pattern of past reforms and the potential for future reform in Eastern Europe. In addition, domestic and external pressures for reform are appraised insofar as they may also influence future East European reform scenarios. Finally, a “short list” of key indicators may provide a means of judging precisely which of the reform processes is taking place in each of the countries.

I. DOMESTIC PRESSURES FOR REFORM

A. WORSENING ECONOMIC AND SOCIAL CONDITIONS

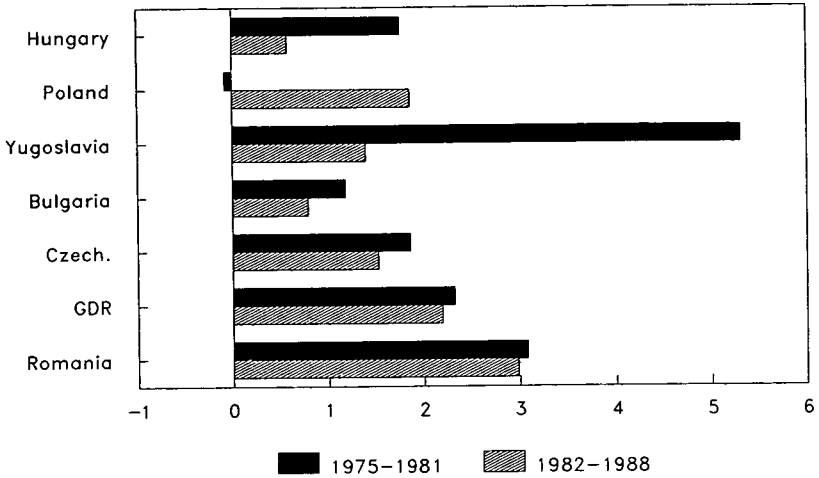
The performance of the East European economies in the 1980's has been poor. All of the countries have experienced declining rates of growth, persistent balance-of-payments difficulties, declining allocation of resources for consumption and investment, a depletion of the capital stock, increasingly obsolescent industrial bases, and a loss of shares of Western markets—particularly in the consumer industries and engineering products.

Economic growth has been stagnant or negative in Eastern Europe throughout the 1980's. In fact, Graph 1 illustrates the dramatic drop in growth rates which East European countries experienced from period 1 (1975–81) to period 2 (1982–88).²

¹ Ed Hewett, “Overview,” ch. I, vol. 1.

² Poland's rate of growth outpaced most other East European countries up to 1979. In 1979, Poland began a slide into a deep depression from which it began to recover in 1983. Thus, although Poland's growth was positive in period 2, only in 1986 did Poland regain its predepression level of GNP.

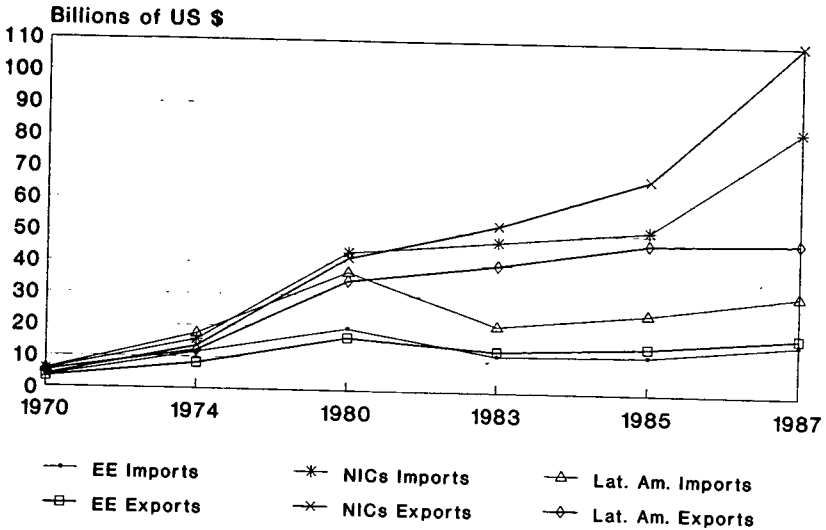
Growth Rates of GNP in Eastern Europe
(in constant US\$, 1975 = 100)



Source: See Thad Alton Contribution
Period changes: Least square growth rate

The relatively backward industrial base and declining competitiveness is reflected in the erosion of Eastern Europe's share of foreign markets, particularly in manufactured and engineering products and consumer goods. Graph 2 shows that in 1975 the East European, Latin American, and Asian nations all had approximately equal shares of the Western market. After 1980, however, East European trade with the West stagnated while Western trade with the Latin American nations and the Asian NIC's increased significantly.

Trade Between the West and Developing Countries

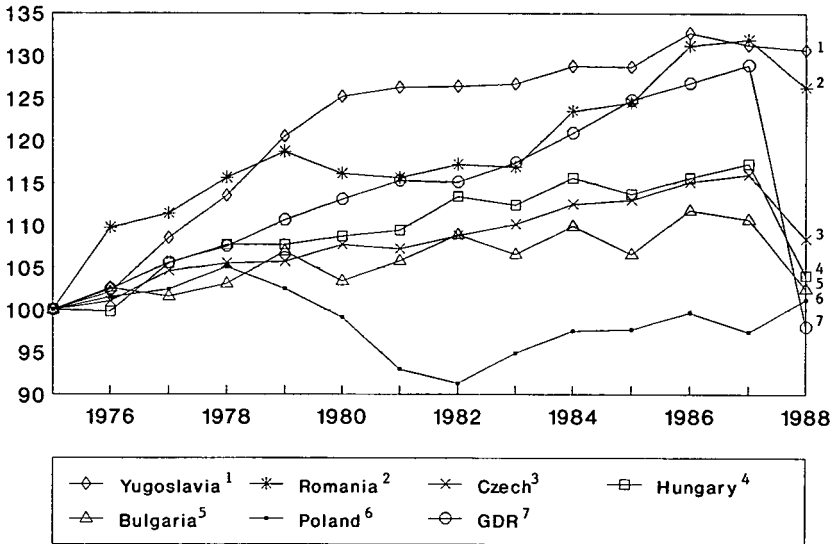


Source: See Contribution by Leyla Woods

Standards of living, as measured by consumption, per capita income, and life expectancy, are on the thin margin of acceptability or worse, and have stagnated or fallen throughout Eastern Europe in the 1980's. In fact, Graph 3 shows per capita GNP sharply deteriorating after 1987 in all East European countries except Poland.³

³ Although Poland's per capita GNP did grow in 1987, the absolute level of per capita GNP remains well below the average of Eastern Europe and only slightly higher than 1975 levels.

Growth of Per Capita GNP
(US\$, 1975 = 100)



See Contribution by Thad P. Alton

Moreover, for the first time since World War II, the life expectancy of East Europeans, particularly in the industrialized nations, is not increasing and has, in some cases, even fallen. Scholars point to mounting evidence of grave environmental conditions, excessive smoking and alcohol consumption and the poor quality of health care as likely causes of the negative trend.

B. REASONS FOR POOR PERFORMANCE

The economic stagnation which has plagued Eastern Europe throughout the 1980's is, in part, due to the systemic shortcomings of Soviet-style central planning. There is increasing agreement in Eastern Europe, the Soviet Union, and the West that this type of system provides inadequate incentives and opportunities for innovation, is accompanied by low levels of productivity, encourages inefficiency, and results in low standards of living and an incompatible participant in the global economy.

But economic stagnation in Eastern Europe must also be attributed to the poor policy decisions in the 1970's, and a difficult external environment in the 1980's: In the late 1960's and early 1970's, many of the East European leadership planned a shift in the pattern of development from a strategy of "extensive" growth, based on a plentiful supply of the factors of production (labor, capital, and land), to a strategy of "intensive" growth which instead would emphasize increased efficiency in the use of these factors. This was

to be accomplished by modernizing industry, primarily through imports of Western technology.

The strategy of import-led growth was meant to increase a country's competitive position abroad by restructuring and modernizing the domestic economy through the effective use of high-technology imports. According to this strategy of growth, countries were to incur debts in the first period of development as they imported technology in order to produce products of higher value. In the second period when creditors were to be repaid, the newly industrializing country was supposed to be able to finance both repayment and further development with earnings from the sale of higher value outputs on world markets.

The strategy did not work in part because of excessive investment in import-intensive industries, neglect of modernizing the agricultural sector, and the use of government subsidies to raise living standards to artificially high levels. Decisions regarding the level and composition of imports were based more on considerations of ideology, political expediency, and excess demand than on cost or efficiency. Investments were not made according to expected rates of return but on the basis of planner's preferences and domestic pressures. Domestic prices, set administratively, distorted behavior. Foreign loans were spent on inefficient (e.g., the import of goods which should have been produced domestically) or unrealistic investments and the opportunities for development were squandered.

The continued burden of hard currency debt servicing has left Eastern Europe in a weakened position. Resources once earmarked for investment and consumption have been diverted to servicing foreign debt. The consistent reduction in domestic absorption exacerbated slow growth, declining competitiveness, loss of market share to the newly industrializing countries, latent social and ethnic tensions, and political instability. Ironically, the countries most committed to market-oriented reform in the 1970's, suffered the most from inefficient expenditures and wasteful management of scarce resources.

High levels of defense spending represent another source of problems for the East European economies. As Thad Alton and his coauthors show, the defense share of GNP has ranged from 6 to 7 percent for most countries, and 10 percent for Bulgaria.⁴ In Eastern Europe, where manpower and capital are scarce, military programs have constituted a costly diversion of resources away from investments that might have improved the economies.

C. PROSPECTS FOR THE 1990'S

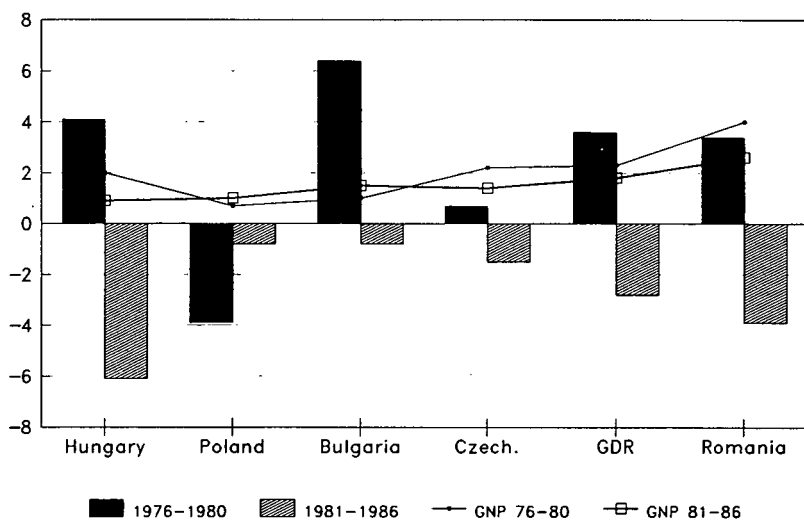
Most experts familiar with Eastern Europe's recent economic record anticipate continued stagnation or worse for the region as a whole in the 1990's. Constraints on future performance include continued declining labor productivity, lagging technology, and poor quality of industrial output. Conditions in the international environment are likely to be as difficult in the next decade as they were in the 1980's, with increasing competition from the newly in-

⁴ Thad P. Alton, Gregor Lazarcik, Elizabeth M. Bass, and Krzysztof Badach, "East European Defense Expenditures, 1975 to 1987," vol. 1.

dustrializing countries, and slow growth in much of the rest of the world. The expectation of further stagnation has given rise to the term "belt of instability" to describe Eastern Europe. Even if meaningful reforms are undertaken, economic performance would not substantially improve until the mid to late 1990's.

Some point to recent reductions in all of the East European nations' defense spending as a sign that reform is being undertaken and that some hope for economic improvement in the medium term may be justified. One positive sign of change may be found in the defense sector: all East European members of the Warsaw Pact reduced their spending for military procurement in the 1980's, and in recent months all, with the exception of Romania, have announced cuts in their overall defense budgets.⁵ (See graph on defense procurement.)

Average Growth in Defense Procurement
in Non-Soviet Warsaw Pact Countries



Source: See Contribution by James Bielli

In fact, a reallocation of resources from the military to the civilian sector is one of the necessary steps toward comprehensive reform. Nevertheless, even assuming that defense burdens are reduced, governments must still make it possible for the resources freed up by reduced defense budgets to be used appropriately and efficiently for economic development. That is, the East European governments must undertake systemic economic reforms.

⁵ See the articles by James L. Bielli, "Trends in Non-Soviet Warsaw Pact Defense Procurement," and Shelly Deutch, "The Non-Soviet Warsaw Pact Defense Industries: An Overview," in vol. 1.

II. EXTERNAL PRESSURES FOR REFORM

A. THE SOVIET UNION

Soviet reforms under Gorbachev are creating some uncertainties in Eastern Europe but are also putting pressures on governments to follow the Soviet lead. Many in Eastern Europe have adopted a wait-and-see approach to changes in the Soviet Union, to determine whether they are permanent and if Gorbachev is likely to stay in power, before supporting a new course themselves. Others recognize that Moscow is loosening its controls over Eastern Europe and that new opportunities for action now exist. In effect, perestroika and glasnost have begun to release pent-up demands for reform within the East European alliance. The announcements of Soviet military withdrawals from the region, some of which have already taken place, and of plans for reducing defense spending, provide concrete evidence that the relationship is changing. These actions were a strong inducement for East European governments to announce their own defense reductions.

Gorbachev has gone beyond relaxing Moscow's rule over the area. But telling the East Europeans that there are many roads to socialism, and criticizing slavish adherence to the Soviet model, Gorbachev has encouraged the idea of diverse economic reform. The economic reforms in Hungary and Poland have been explicitly approved, although the other countries whose Brezhnev-era leaders oppose reforms are not being pressed to do the same. Nevertheless, the Soviet Union would like a revitalized Eastern Europe which will engage in broader economic intergration within the Council of Mutual Economic Assistance (CMEA). There have been a number of Soviet efforts to achieve this goal within the framework of the alliance. Most of these efforts have not been notably successful, largely because East Europeans view integration as a potential means of domination by the Soviets.⁶ Thus, one reason for heightened East European interest in Gorbachev's reformist approach is that it signifies greater opportunities for self-determination and allows for the development of increased economic ties with the West.

B. THE WEST

There is a growing tendency in the West for economic relations with the East conditioned, directly or indirectly, on progress toward reforms. The United States has been more explicit than other countries about this kind of conditionality, but others seem to be moving in the same direction. An example is the efforts of Western governments, the World Bank, and the International Monetary Fund to help develop a stabilization program and debt servicing plan in Poland which would strengthen the impetus for democratic and market-oriented reforms.⁷ Attempts by Eastern Europe

⁶ See the articles on CMEA and Soviet-East European Relations in ch. III, vol. 2, by Karen Dawisha, Lucja Swiatkowski, Judith Thornton, Steven Popper, Keith Crane, A. Jarmozko, and others.

⁷ Karen Dawisha, "Eastern Europe and Perestroika Under Gorbachev: Options for the West," vol. 2.

to achieve closer economic integration with the West are likely to add to the momentum for economic and political reform.

The United States has been a leader in either facilitating or restricting commerce with the East. The policy of differentiation is intended, in part, to reward East European countries who adopt liberal economic and political policies. Some experts advocate a new policy of differentiation in which the United States would narrow or redefine export controls and other trade restrictions, resume government loan insurance and guarantees, and help finance commercial projects that are managed by private groups in Eastern Europe.⁸

III. ALTERNATIVE SCENARIOS: EQUIVOCAL OR COMPREHENSIVE REFORM?

A. AMBIGUOUS RESPONSE TO ECONOMIC DECLINE

East European policymakers have responded to economic shortfalls, social restiveness, and political challenges in the 1980's by introducing a variety of limited reforms. Economic reforms have focused on improving productive efficiency and the quality of outputs. Social reform has been introduced in several countries in the area of human rights such as more liberal policies toward foreign travel. Censorship has been reduced in several countries, and semi-free elections have been held in Poland. While changes have varied in degree and success, according to the specific circumstances of each country, so far most of all the reforms that have been implemented may be characterized as limited: either political reform is undertaken in the absence of economic liberalization or the other way around. In either case, partial reform effectively leaves power in the hands of the party. Recently, several countries have announced comprehensive reform programs. Whether they will be fully implemented cannot be known.

The difficulties that face centrally planned economies embarking on a gradual path of reform can be seen in the experiences of those countries who have been engaged in the process for more than two decades. This category includes Yugoslavia, which split with the Soviet Union in 1948 and began a slow process of reform and opening up to the West; Poland, which began a process of reform within the framework of the bloc as early as 1956—when it privatized much of the agricultural sector; and Hungary which formally instituted the New Economic Mechanism (NEM) in 1968 and has since become the foremost reformer in the bloc. For the most part, the reforms in these countries may be characterized as limited market-type reform superimposed on centrally planned systems which have remained basically unchanged and functional. Much of the apparent early successes of those initiatives can be explained by the short-term effects of heavy foreign borrowing.

The contradictions inherent in an equivocal approach are illustrated in Paul Marer's study of Hungarian reform.⁹ Reformers in

⁸ Stuart S. Brown, "U.S. Commercial Policy Toward Eastern Europe," vol. 2.

⁹ Paul Marer, "Conceptual Framework for Reform: The Hungarian Experience in the Kadar (1956-88)," vol. 2.

Hungary decentralized decisionmaking to establish a degree of managerial flexibility and entrepreneurship at the firm level. However, the absence of market conditions, and the continued rights of the central and local bureaucracies to intervene in managerial decisions, held back entrepreneurship and improvements in economic performance. The reforms created new opportunities for technological modernization and increased living standards through trade with the West. But the negative aspects of central planning contributed to high import dependencies and hard currency debts.

Those countries which have traditionally been more reluctant to reform, such as the German Democratic Republic and Czechoslovakia, may appear to have done better economically relative to the professed reformers, although the statistical evidence is difficult to interpret.¹⁰ The improvements in quality and variety of manufactured goods that reforms brought, for example in Hungary, are not easy to measure.

The German Democratic Republic, which did not introduce market-type reforms, has reaped considerable gains from its links with the Federal Republic of Germany. Czechoslovakia has recently avoided problems of foreign debt with a conservative borrowing policy. Both East Germany and Czechoslovakia have, however, begun to exhaust the advantages of centralized economic systems. They have experienced declining factory productivity, inefficient use of energy and natural resources, declining competitiveness, and worsening environmental problems. Romania and Albania have, in general, followed the Stalinist model of policymaking, with Romania recently solving its balance-of-payments problems at the expense of the welfare of its own people. Today, living standards in both countries are far below the average in other East European countries.

The Council for Mutual Economic Assistance in the past has not achieved a consensus for reforms. In the words of Josef M. van Brabant, CMEA has been "rather passive and immune to the successive Eastern European economic crises . . ." ¹¹ But if Soviet reforms produce demands for higher quality imported goods and open the U.S.S.R. to the West, the traditional comparative advantage which the nonreformers have enjoyed within the noncompetitive shelter of the CMEA market may be threatened.

1. Rationale for Equivocal Reform

Most East European leaders have adopted an equivocal approach to reform. In the view of some East Europeans, a gradual process of change is all that is necessary to improve the existing system. Others believe that gradual reform is less disruptive and costly than radical measures, and will be more effective over the long run. It should be pointed out that the process of change from Stalinist central planning to a more decentralized system has not yet been achieved and therefore no one can be certain about ultimate outcomes. There is no assurance that reforms result in improved performance.

¹⁰ Papers by Gerhard Fink, Havlik, and Thad P. Alton in Ch. II, vol. 1, discuss the inadequacies of official East European statistics and the uncertainties in Western estimates.

¹¹ Josef M. van Brabant, "Toward a Renewal of Socialist Economic Integration (SEI)?" vol. 1.

Another interpretation is that East European leaderships have been intentionally equivocal because they fear the effects of fundamental reform for several reasons. First, because systemic change is tantamount to a renunciation of past governance and would directly threaten their positions as the small nonelected elite with the right to govern by administrative fiat. Second, leaders fear the social consequences of far-reaching reforms insofar as systemic change will lead to high unemployment through shrinkage of the bureaucracy and restructuring of the economy. Third, the status quo is considered preferable because even successful reform will be preceded by a politically painful period in which principles of egalitarian social benefits might be overturned and the potential for political, social, and economic instability greatly increased. Finally, many East European leaders, workers and peasants may argue, as indicated above, that reforms in the direction of marketization in socialist countries have been associated with greater stagnation or instability than exists in those countries that have not adopted drastic reforms.

2. Increasing Risks of Defending the Status Quo Through Equivocal Reform

In the future, equivocal reform may be used as a way for leaderships to hold on to power while paying lip service to reform through the introduction of selective, narrow change. The policy of announcing reform without fully implementing it has been used many times to convince critics that sufficient progress is being made to warrant a compromise between those advocating and resisting change, to end strikes, and to gain Western credits or debt rescheduling. Some governments may use this device to again gain time either for internal political reasons or to determine whether the Brezhnev doctrine will be explicitly rejected and if perestroika becomes a self-sustaining process in the Soviet Union.

The strategy of equivocal reform has several shortcomings. First, it has been employed so often that it is widely seen by domestic populations as a delaying tactic. Second, since delays usually lead to worsening problems and demands for progress toward reform as a condition for Western credits or other benefits, the tactic has often proven counterproductive. Indeed, delays may simply complicate the process, leading to a more painful transition when it does finally take place.

Finally, and perhaps most significant, the risks of equivocation have further increased since, as Paul Marer notes, the threat of Soviet intervention based on the Brezhnev Doctrine has been removed for most countries in Eastern Europe and the expectation of rising incomes has been withdrawn. In other words, the traditional "stick" (Soviet threat) and "carrot" (higher standards of living) which justified and even bolstered equivocal reform have now been removed. East European governments which employ equivocal reform to stay in power now risk further loss of credibility with their own publics and with foreign governments, creditors, and international organizations. One might, in fact, argue that the logical outcome of equivocal reform is comprehensive reform.

B. COMPREHENSIVE REFORM

There is a growing belief that comprehensive reform—defined as a process of systemic change in the domestic and foreign economic, political, military, and social spheres—is necessary to ensure long-term economic growth and competitiveness in global markets. In the past, incentives for comprehensive reform have been too weak to overcome inertia and bureaucratic resistance. Now, converging pressures for radical change in many areas are stronger than at any time in the postwar period. Major sources of these pressures include increasing popular dissatisfaction with economic stagnation and political repression; the emerging process of reform under the umbrella of perestroika and glasnost in the Soviet Union; and anticipated changes in current Brezhnev-era leaderships throughout Eastern Europe. To some extent, the international community, where Western nations and multilateral organizations have been conditioning beneficial commercial policies on reform, is also a source of pressure for reform in Eastern Europe.

What would comprehensive reform look like? Although no one can say precisely how any individual country might proceed or what the outcome would be, there are indications of what a comprehensive program would contain. These indications come from the nature of current problems facing East European governments attempting to reform, the record of earlier reform initiatives, and the dialogue between government and people in various Eastern countries. What follows are the major elements of a framework of comprehensive reform in Eastern Europe.

1. Framework of Comprehensive Reform

Economic Reform.—The process of reform requires some degree of decentralization of decisions about the allocation of resources and of economic management. The goal is an economy in which choices are made rationally, on the basis of objective criteria, and where resources are used efficiently. Knowledge of the costs of inputs is essential. Change from administered to market-determined prices is a precondition to a rational system. Self-management, self-financing, and accountability at the enterprise level is necessary, along with incentives for innovation and high performance. There should be substantial disengagement of the government and the Communist Party from micromanagement of the economy, reduction or elimination of subsidies, and adherence to Western standards of statistical reporting.

Restructuring.—A reordering of priorities and shifts in the composition of economic activity would accompany effective reform. Economic modernization requires increased investment and incentives that are related to increasing the efficient use of inputs and the quality of outputs. Reduction of government subsidies and price reform would encourage greater producer responsiveness to consumer demand. Ownership of private property and other opportunities for individual and cooperative advancement would enhance the likelihood of greater productivity. Likewise, encouraging private enterprise could lead to increased domestic competition and efficiency. Restructuring should extend to the defense sector so that

military demands for resources are balanced against the interests of the rest of society.

Integration Into the World Economy.—Ending the government's monopoly over foreign trade, opening domestic markets to foreign firms, and encouraging foreign investment would expose inefficient enterprises to competitive forces and introduce the principle of comparative advantage into commercial relations with the rest of the world. Protectionism is especially inconsistent with the achievement of world quality standards in manufactured goods.

Political Reform.—Comprehensive reform requires democratic participation and sharing in decisions, free speech, and the rule of law. The social contract between the governments and the people needs to be redefined so that the governed have confidence in and respect for their governments, and, in the short term are willing to support government austerity programs and in the long term to contribute fully to the economy. The official limits on political reform assume continuation of the leading role of the Communist Party and central planning. Whether that is likely or desirable is now open to question even in official circles.

2. Adjustment Costs

Comprehensive reform may be the only way East European governments can reverse the recent trends toward economic stagnation. Unfortunately, there are high costs associated with reforms. Shifting an economy from a centrally planned and bureaucratically managed system to one which is decentralized and market oriented will generate significant transitional problems. Many of these problems may be anticipated:

Decentralization and self-management for enterprises will be resisted by government ministries and party officials, many of whom will face loss of position, privileges, and power.

Self-financing and accountability will be opposed by inefficient enterprise managers and workers whose jobs will be at risk if state subsidies are reduced or eliminated.

Price reform may lead to inflation in food prices and consumer goods as subsidies are withdrawn from these products, resulting in at least a temporary fall in living standards.

Industrial and agricultural modernization will require interruptions of production and temporary reductions in output while plants are renovated and new equipment installed.

Wage differentials for workers who excel, rewards for innovation, and incentives for private entrepreneurship will be resisted by those whose wages are fixed or who oppose inequality of wealth as a matter of philosophy.

Reduced protectionism will mean bankruptcy or its equivalent for enterprises unable to compete with foreign firms.

Failure of the governments to effectively introduce or win popular support for reforms could further undermine their legitimacy and increase political instability.

IV. INDICATORS OF REFORM

Western economists agree that over the longer term the potential benefits of comprehensive reform in Eastern Europe far out-

weigh the transitional costs. In 1989, economic decline in the region continued with signs of further stagnation in growth, deterioration of infrastructure, shortages of consumer goods, and non-competitiveness in foreign markets, among many serious problems. A strong consensus is emerging that given the current risks of continued stagnation in the region, East European governments cannot afford to further delay taking decisive actions. As indicated earlier, several countries have announced their intentions to decentralize economic decisionmaking and expand the use of market principles. At least two countries, Hungary and Poland, seem on the verge of comprehensive change in the economic system and Yugoslavia seems to be leaning in the same direction.

There are several indicators to look for, in assessing progress toward comprehensive reform. Paradoxically, a further slowdown in economic growth due to shutdowns of industrial plants now heavily subsidized and high unemployment during restructuring could be a sign that fundamental reform is underway. A shift toward market prices would perhaps be the single most important indication of a commitment to reform. A transfer of authority to enterprises over decisions about exports and imports, and an opening of domestic markets to foreign firms, would demonstrate a decision to abandon protectionism in favor of integration into the global economy. Publication of economic statistics, over a sustained period, using internationally accepted methods, is another important sign. And, in the long term, increased exports of manufactured goods to hard currency nations would be the best evidence of successful industrial restructuring and improvements in the quality of output.

Political reforms, on the other hand, are more readily apparent: a shift from authoritarian to democratic principles would include free elections, some form of participatory government, the right to free speech and assembly, and enforcement of the rule of law.

I. EASTERN EUROPE AND THE INTERNATIONAL ECONOMY

OVERVIEW

By Ed A. Hewett*

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I. SUMMARY

When projecting economic aggregates it is useful to identify first a "baseline" projection, reflecting the most plausible assumptions about exogenous and policy variables, and then to ask how variations in policy, or different assumptions about exogenous variables, might affect the outcome. The result is a range of alternative projections of the major economic indicators: GNP and its major components, the external balance, employment, and so on. The baseline projection indicates the most likely outcome; alternative projections—based on variations in particular assumptions—can be used to explore alternative possible, but less likely, scenarios.

Ideally one would like to be able to follow the same procedure in forecasting more generally the path of an economic system over a period of time, where various scenarios would depend on different assumptions regarding economic policy, the international economic environment, and political developments. The authors of these papers do not attempt anything so ambitious for the East European countries, which is understandable given the enormous data requirements associated with such an approach, and indeed the impossibility of quantifying such critical variables as the evolution of political systems.

Nevertheless, the notion of a baseline projection, and then of different scenarios linked to variations in assumptions, is a useful one. And these articles provide considerable guidance concerning what the projections would suggest. In this note I will briefly discuss what I draw from these pieces, using the general baseline-alternative projection framework to explore alternative outcomes. My statements will, of necessity, be primarily qualitative; and I will focus on Eastern Europe as a whole, ignoring for the most part the very real differences among the various countries. There is much that distinguishes these countries from each other—and I will allude to some of the most important differences as I go along;

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but there is much that unites them, which provides the focus for these comments.

II. THE BASELINE PROJECTION

In thinking about the global economic environment in which East Europe will have to make its way during the remainder of this century, it seems that the most likely scenario is more of the same, or—if not that—a further deterioration in the external conditions facing the East European economies. Thomas Bayard's view of East Europe's economic relations with the West certainly points in that direction. It was a grim decade for Eastern Europe in which economic pressures grew from multiple sources: high real interest rates, a global growth slowdown focused in traditional East European export markets, and increasing competitive pressure from the newly industrializing countries. The burden of proof lies with those who would suppose that the 1990's will somehow turn out better: that real interest rates will fall, global economic growth will accelerate, or that competition from the NIC's will abate.

Even though that is a possible outcome, it would be imprudent for East European policymakers to count on it. For the baseline a prudent planner would assume a continued deterioration in the external environment: (1) that the NIC's will grow even more aggressive in their search for increased market share, and that there will be more NIC's to contend with; (2) real interest rates are unlikely to fall; and (3) global economic growth is unlikely to accelerate significantly. Moreover East European policymakers must look at the European Community plans to unify its internal market in 1992 with considerable trepidation, the fear being that trade diversion, not trade creation, will dominate. Even if "1992" actually occurs later in the decade, it is a frightening prospect for marginal exporters such as the East European countries generally are.

The situation in East Europe's relations with the East is no more promising. Jozef van Brabant shows quite convincingly that the bulk of CMEA leaders have turned with new dedication to the task of reforming that organization, in yet another effort to harness economic integration to the search for ways to improve efficiency and enhance economic performance. But, despite the clearly earnest desires of CMEA leaders, and the new atmosphere surrounding Soviet reforms, outlined in the paper by John Hardt and Jean Boone, it would be terribly optimistic to believe that something of consequence could come out of these efforts.

To be sure, the CMEA countries are—by world standards—almost "unintegrated," thus the potential benefits from true integration are huge. The incredibly complex and constantly expanding interconnections among the industrialized West's capital and product markets have contributed significantly to generally strong growth performance in the last quarter century. The CMEA countries, having remained outside that integration process, find themselves with a set of antiquated economic institutions incapable of even comprehending, let alone taking advantage of, economic opportunities in the global economy. If, even within CMEA, these countries could begin to emulate what the developed countries

began in the 1960's, that would no doubt significantly improve economic performance.

But it is simply wishful thinking to believe—as many CMEA economists and leaders seem to believe—that a reform of CMEA itself, and of its procedures, could significantly contribute to genuine integration of the CMEA economies. The lack of tangible results of any significance from previous CMEA reforms stems not from an inability to devise a sufficiently clever reform program, but from the simple and quite unavoidable fact that the impediments to genuine integration of the CMEA economies lie in the economic systems themselves. No matter how many or how few CMEA Standing Commissions there are, no matter how many or how few CMEA bureaucrats, no matter how great or how small a proportion of the Transferable Ruble is “convertible,” the fact remains that without economic reforms in the individual CMEA economies, their integration with the West or with each other is little more than a fond hope.

If there is a new element it is *perestroika* in the U.S.S.R., and the policies which accompany it. It is at least conceivable that the new fervor for radical reform in the U.S.S.R. will unleash similar forces in Eastern Europe, leading to dramatic improvements in economic performance, even in the face of an essentially unchanged (and basically hostile) economic environment. It is a conceivable outcome; but it seems unlikely.

In the first place, that which has been known to many East European specialists for some time is now clear to the world at large: the impediments to economic reforms in Eastern Europe are (and have been for some time) primarily internal. The general timidity with which East European countries have approached reforms, and with which they still approach reforms, reflects the constellation of political forces in those countries. It was increasingly irrelevant under Brezhnev that Soviet leaders would have frowned on radical economic and political reforms: East European parties, having become entrenched, have their own good reasons to go slowly in reforms.

Moreover, even if Eastern Europe proves susceptible to the new winds of reform blowing from the East, it will be some time before those reforms—however well executed they might be—would begin to perceptibly affect economic performance. Economic reforms take time to prepare, to implement, and to have an impact. So even someone who is optimistic about the short-term prospects for economic reforms in Eastern Europe should be pessimistic about their short-term consequences for economic performance.

The more immediate consequences of *perestroika* are most likely to show up not in the area of systemic changes, but in a further hardening of the demands Soviets place on Eastern Europe for high quality—really hard currency export quality—goods and services. Already, even before the foreign trade reforms in the U.S.S.R. have taken serious hold, the Soviet requirements regarding the quality of East European goods have grown more demanding as central planners have sought to harness East European industry to the modernization program for Soviet industry. If, and when, foreign trade decentralization makes strides in the U.S.S.R. so that individual enterprises have the power and incentive to make their

own decisions on an economic basis regarding imports of manufactured goods, then the demands on Eastern Europe for high quality goods should grow even more stringent.

On the other side of the ledger, the shift toward a new emphasis on *khozraschet* in the U.S.S.R., when and if it is accompanied by a reorientation of investment priorities, will most likely lead to an even greater reluctance than in the recent past to expand exports of raw materials and fuels (which are so extremely costly in terms of increasingly scarce new capital).

Taken as a whole, the baseline projection points to more of the same for Eastern Europe, where "the same" means a secular increase in economic pressure on the region. As Kohn emphasizes, East Europe's economic (and, for that matter, political) situation is hardly alarming by world standards. There are many less-developed countries with far higher debt levels and far lower per capita national income levels. Moreover, the pressures on individual East European countries from the external environment vary widely. East Germany benefits from a special deal with the FRG. Romania is reaping the benefits in its external accounts of incredible draconian measures at home. Czechoslovakia has chosen to become an industrial museum for Europe, thus avoiding immediate balance of payments pressures which would accompany any attempt to seriously compete in the world economy. It is Poland, Hungary, and Bulgaria which, to different degrees, are feeling the new pressures the most acutely; although for some of the other countries—most notably Romania and Czechoslovakia—the policies of the 1980's will cost dearly in the 1990's.

While East Europe's situation, taken in world context, is not the worst, it is still a difficult one fraught with economic and political uncertainties. The need for continued, and even greater, austerity in many of these countries in the remainder of this century will create increasing political tensions, which—given the increasingly "hard" Soviet stance—is quite likely to lead to social and political unrest in one or more countries in the region.

How serious the problems will be, and how serious their consequences, depends on how Eastern European countries respond to their environment. I assume for this baseline that in general East European leaders repeat the pattern of the 1970's and 1980's: some reforms, and some changes in policy, both of which have a positive effect on performance; but nothing bold or terribly decisive. It amounts to "muddling through" with sufficient flexibility to avoid the most treacherous pitfalls, but with sufficient conservatism so that the more dramatic possibilities for improving the situation remain unexplored.

III. ALTERNATIVE FUTURES

In thinking about other scenarios which might look—from the East European point of view—better or worse, it is useful to distinguish between more optimistic or pessimistic assumptions about changes in East Europe's external environment, and more optimistic or pessimistic assumptions about how East European countries will respond to whatever situation may evolve in their external economic environment.

In my view the base line assumptions regarding the basic characteristics of East Europe's economic environment can almost be taken as givens for the remainder of this century (a mere 11 years). The interesting issue is whether Eastern European countries might, individually or collectively, respond either less or more effectively than implicitly assumed in the baseline case.

The optimistic case would have to be built on the assumption that economic reforms in Eastern Europe would move ahead quickly; that they would be accompanied by intelligent investment policies (focused on the promising industries, and deemphasizing smokestack industries which traditionally have eaten up so much of East European capital investment); and that the international financial community and world governments would be sufficiently impressed with the new strategies to support them with fresh capital.

While this optimistic scenario is not excluded, it seems an unlikely outcome, primarily because it would require some very strong economic medicine which most East European governments would find it politically difficult to administer: heavy import competition leading to large-scale bankruptcies and layoffs; a further deterioration in the balance of payments; further austerity in the interim until productivity and exports respond to the competitive pressures; and high inflation rates for some period of time (depending on how the austerity is handled).

It is, on the other hand, possible to conceive of a more pessimistic scenario than that of the baseline case in which Eastern Europe as a region seeks to revert to old approaches, similar to the Czechoslovak strategy since 1968. The result would be an even more rapid deterioration in living standards and productivity than the baseline case, but with a decent performance in the external accounts reflecting tight import controls, and domestic austerity. This is borrowing from the future, but nevertheless appealing to leaderships searching desperately for ways to avoid the difficult decisions involved in responding now to the challenges of operating successfully in the global economy.

These two scenarios highlight a great irony in Eastern Europe today. Radical economic reforms, which are the only effective long-term strategy for Eastern Europe, are painful in the shorter term. There is what economists looking at the effects of devaluation on a country's trade balance calls the "J-curve": things get worse before they get better. The balance of payments will deteriorate in the first phases of an economic reform; austerity will be required; jobs will be threatened; and so on. But then, as the economy responds, economic indicators improve as the economy sets out on a new, and sustainable, growth path.

Doing nothing, on the other hand, produces a false aura of tranquillity which is enormously alluring to politicians who are either too frightened to attempt reforms they fear they might not survive, or too uncertain that reforms will be worth the trip even if they do survive. It is a classic political choice, and for most East European countries it is easier to suppose that the leadership will avoid the

hard choices rather than facing up to them. If they avoid difficult decisions, then the baseline scenario is too optimistic; if they just avoid some of them—as they have in the past—then the baseline scenario is the most reasonable projection.

SHIFTING GLOBAL ECONOMIC TRENDS

By Thomas O. Bayard*

The Eastern European countries have fared poorly in the sometimes turbulent, always highly competitive, international economic environment of the 1980's.¹ Thus far in this decade, the CMEA-Six have suffered from slow global economic growth which has contributed to weak demand for their exports, high real interest rates which have increased the cost of international borrowing, and intense competition from the Newly Industrializing Countries (NIC's) which has cut into Eastern Europe's share of world manufactured exports. Moreover, international market trends for the rest of this decade are not likely to improve Eastern Europe's economic fortunes. This paper surveys recent and prospective global economic trends affecting Eastern Europe and discusses some East-West economic issues likely to confront Western decisionmakers in the next few years.

Some of Eastern Europe's economic problems in the 1980's have their origins in domestic policy decisions and global economic events that occurred in the previous decade. Seeking to modernize their economies and promote faster growth, in the early 1970's Eastern European planners decided to increase imports of Western capital goods and technology. Hard currency exports, however, were insufficient to pay for these imports, and so trade deficits with the West mounted until the mid-1970's and continued at declining levels until 1981.

These deficits were financed through international borrowing from public and private Western institutions and Eastern Europe's net hard currency debt jumped from \$5 billion in 1971 to \$51 billion in 1979. The borrowing took place on very attractive terms. The average annual real interest rate in the 1970's was only 1.3 percent (see Table 1), which was low by historical standards, but reflected the ready availability of OPEC's surplus funds which were recycled by commercial banks to borrowers in Eastern Europe and the Third World.² The banks were disposed to lend on favorable terms on the then popular theory that sovereign borrowers, particularly Soviet-backed governments, do not go bankrupt. By the late 1970's, however, Western lenders became less sanguine about the riskiness of their loans to Eastern Europe, as Poland began to experience problems servicing its large debt (\$24 billion in

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¹ The Eastern European countries discussed here are: Bulgaria, Czechoslovakia, the German Democratic Republic (GDR), Hungary, Poland, and Romania. They will also be referred to as the CMEA-Six.

² The "real" interest rates shown in Table 1 are deflated by the U.S. GNP deflator. A preferable alternative, Eastern European hard currency export prices, was not available for the period 1970-88.

1979). Credit conditions tightened significantly in 1980 and by 1981 there was a net outflow of Western commercial bank claims on Eastern Europe.

The oil price increase of 1979-80 helped plunge the world economy into the longest and arguably the most severe recession since the Great Depression. Fearing a renewed bout of inflation caused by higher energy prices, in 1980-82 monetary authorities in most western industrial countries pursued relatively tight monetary policies which helped drive real interest rates up to extraordinary levels. The demand depressing effects of the "OPEC tax" and higher interest rates caused global GNP growth to plummet and, as a result, world trade stagnated.

TABLE 1.—GLOBAL ECONOMIC TRENDS, 1970–89

| | Average 1970–79 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | Average 1980–87 | Average (projected) | | |
|--|--------------------|------|-------|------|-------|------|-------|-------|------|--------------------|---------------------|------|---------|
| | | | | | | | | | | | 1988 | 1989 | 1980–89 |
| Real GNP/GDP (percent change): | | | | | | | | | | | | | |
| World | 4.1 | 2.1 | 1.7 | 0.5 | 2.6 | 4.5 | 3.2 | 3.2 | 3.0 | 2.6 | 3.0 | 3.0 | 2.7 |
| Western industrial countries..... | 3.3 | 1.3 | 1.5 | -.3 | 2.7 | 4.9 | 3.2 | 2.7 | 3.1 | 2.4 | 2.8 | 2.6 | 2.5 |
| United States | 2.8 | -.2 | 1.9 | -2.5 | 3.6 | 6.8 | 3.0 | 2.9 | 2.9 | 2.3 | 2.9 | 2.7 | 2.4 |
| Japan | 5.2 | 4.3 | 3.7 | 3.1 | 3.2 | 5.1 | 4.9 | 2.4 | 4.2 | 3.9 | 4.1 | 3.8 | 3.9 |
| Germany, Fed. Rep..... | 3.1 | 1.5 | 0 | -1.0 | 1.9 | 3.3 | 2.0 | 2.5 | 1.7 | 1.5 | 1.7 | 1.7 | 1.5 |
| Europe..... | 3.2 | 1.6 | .2 | .7 | 1.7 | 2.7 | 2.5 | 2.6 | 2.6 | 1.8 | 2.0 | 2.0 | 1.9 |
| Developing countries | 5.6 | 3.4 | 1.6 | 1.6 | 1.8 | 4.2 | 3.2 | 4.1 | 3.1 | 2.9 | 3.7 | 3.9 | 3.1 |
| Eastern Europe (net material product)..... | 6.4 | .1 | -1.9 | .1 | 3.9 | 5.3 | 3.7 | 4.6 | 3.2 | 2.4 | NA | NA | NA |
| Trade volumes (percent change in imports): | | | | | | | | | | | | | |
| World | 6.2 | 1.2 | 1.0 | -2.3 | 2.9 | 6.8 | 2.9 | 4.6 | 4.9 | 3.0 | 5.5 | 4.3 | 3.4 |
| Western industrial countries..... | 6.5 | -1.6 | -1.6 | -.6 | 4.6 | 12.6 | 4.6 | 9.0 | 6.1 | 4.1 | 6.0 | 3.9 | 4.3 |
| United States | 7.0 | -7.9 | .6 | -3.7 | 13.0 | 24.8 | 5.1 | 14.8 | 5.1 | 6.5 | 5.9 | 3.1 | 6.1 |
| Japan | 7.2 | -5.0 | -2.2 | -.5 | 1.2 | 10.8 | .4 | 12.5 | 8.3 | 3.2 | 12.7 | 5.1 | 4.3 |
| Germany, Fed. Rep..... | 9.1 | -.2 | -5.0 | 1.0 | 4.0 | 5.5 | 4.6 | 5.9 | 5.0 | 2.6 | 5.2 | 4.2 | 3.0 |
| Europe..... | 6.1 | 1.1 | -4.0 | 1.7 | 2.4 | 6.5 | 4.7 | 7.1 | 6.6 | 3.3 | 5.1 | 4.0 | 3.5 |
| Developing countries | 6.7 | 7.2 | 8.0 | -3.9 | -2.3 | 2.8 | -1.1 | -4.6 | 2.8 | 1.1 | 7.2 | 5.8 | 2.2 |
| Eastern Europe..... | | | | | | | | | | | | | |
| Imports | 8.1 | 1.0 | -5.3 | -6.3 | 3.3 | 5.4 | 6.0 | 3.8 | .6 | 1.1 | NA | NA | NA |
| Exports..... | 8.4 | 2.4 | .9 | 5.0 | 7.5 | 8.3 | 1.8 | 1.5 | 2.2 | 3.7 | NA | NA | NA |
| World trade prices (in U.S. dollar terms; percent change): | | | | | | | | | | | | | |
| Manufactures | 10.6 | 10.4 | -3.9 | -2.1 | -2.8 | -3.0 | 1.1 | 18.0 | 12.0 | 3.7 | 8.0 | 3.4 | 4.1 |
| Oil | 27.6 | 63.5 | 9.9 | -4.3 | -11.9 | -2.1 | -5.0 | -49.8 | 28.6 | 3.6 | -7.8 | 5.1 | 2.6 |
| Nonoil primary commodities | 11.3 | 5.5 | -13.5 | -9.9 | 6.9 | 4.2 | -12.9 | -1.2 | 3.4 | -2.2 | 9.4 | 1.0 | -.7 |
| Interest rate on external borrowing: | | | | | | | | | | | | | |
| Nominal 6-month LIBOR..... | 8.3 | 13.9 | 16.7 | 13.6 | 9.9 | 11.3 | 6.6 | 6.9 | 7.3 | 11.0 | NA | NA | NA |
| Real 6-month LIBOR (deflated by U.S. GNP deflator)..... | 1.3 | 4.3 | 6.4 | 7.3 | 6.3 | 7.1 | 5.4 | 4.3 | 4.3 | 5.7 | 4.7 | 4.3 | 5.4 |

Sources: International Monetary Fund, World Economic Outlook, April 1988, and International Financial Statistics (various issues) for data on the market economies. Economic Commission for Europe, Economic Survey of Europe 1987–88 for data on Eastern Europe.

Heavily indebted countries in Eastern Europe were doubly hard hit by what has become known as the "scissors effect" of the global recession of 1980-82. Higher interest rates increased the burden of servicing their international borrowing, while simultaneously the slowdown of global demand for their exports made it more difficult to earn the hard currencies needed to meet their now larger debt obligations.

The oil shock of the early 1980's also had adverse effects on Eastern Europe, which buys most of its energy imports from the Soviet Union. Since 1975, the Soviet Union has based its energy prices to the CMEA-Five (excluding Romania) on a 5-year moving average of world market prices. The Soviets passed on the worldwide price increases of the early 1980's, but at a slower rate which allowed time for adjustment.

There is a longstanding debate over the relative importance of external economic shocks versus internal policy choices in explaining individual country's economic performance in the 1980's. Measurement problems, particularly for the Eastern European countries, have thus far precluded any definitive answers. But path-breaking work by Bela Balassa suggests a plausible explanation for Eastern Europe's poor economic performance in this decade.

Balassa analyzes the magnitude of the 1974-76 and 1979-81 external shocks faced by a group of private market NIC's and two socialist countries, Hungary and Yugoslavia, and their economic performance after the shocks.³ He divides the group examined into two categories: (1) outward-oriented countries, which give similar economic incentives to export and import-competing sectors and to industry and agriculture; and (2) inward-oriented countries, which give preferential incentives to import-competing sectors and to industry. South Korea and Taiwan are examples of outward-oriented countries, while Argentina, Hungary, and Yugoslavia are included in the inward-oriented group.

Balassa finds that the outward-oriented countries, because they are more dependent on exports, suffered larger shocks than the inward-oriented countries. But in the aftermath of the shocks, the outward-oriented NIC's fared much better than the inward-oriented countries. Their post-shock growth rates were significantly higher and they increased their shares in world export markets, while inward-oriented countries lost global market shares. Balassa attributes the difference in economic performance between the two groups to differences in policy: export promotion was more effective than import substitution in fostering growth. The Eastern European economies are stereotypical inward-oriented economies. To the extent that Hungary's adjustment experience is representative of Eastern Europe's, Balassa's findings help explain why the CMEA-Six fared so poorly after the shocks of the early 1980's.⁴

The international economic environmental improvement modestly after the global recession of 1980-82. Led by U.S. and Japanese growth, the world economy has expanded at an average annual

³ Bela Balassa, "Adjustment Policies in Socialist and Private Market Economies," World Bank Discussion Paper No. DRD147, October 1985.

⁴ For an excellent comparison of the adjustment experiences of the NIC's and Eastern European countries, see L. Tyson, "The Debt Crisis and Adjustment Responses in Eastern Europe," *International Organization* 40 (Spring 1986).

rate of 2.6 percent in this decade, which is substantially less than the 4.1 percent average growth rate of the 1970's. Eastern Europe, however, has performed significantly worse than the rest of the world. Although Eastern Europe's net material product is not entirely comparable to Western GNP, it is instructive to note that Eastern Europe's average annual growth in this decade has fallen by over 60 percent compared to the 1970's, while the Western industrial countries average growth rate has fallen by less than 30 percent and the developing countries' growth has declined by approximately 50 percent.

Several external economic factors have contributed in part to Eastern Europe's dismal performance. Real interest rates on international borrowing, although they have fallen since 1982, remain high by historical standards. For the heavily indebted Eastern European countries, high debt-service costs represent a continuing constraint on growth by reducing the potential resources available for investment.

High global interest rates, in turn, are a reflection of the most prominent feature of the international economic environment of the 1980's: the persistence of huge global economic imbalances. One manifestation of these imbalances is the emergence of a massive U.S. current account deficit, which reached \$150 billion in 1987, and large counterpart surpluses in Japan, Taiwan, Korea, and Europe, especially in Germany. The U.S. trade deficit, caused in large measure by the Government budget deficit, has been financed by international borrowing, which has helped keep global interest rates high.

To be sure, the U.S. trade deficit also has helped maintain trade and growth in the world economy. Between 1982 and 1986, U.S. import volume grew three times as fast as world trade and accounted for approximately half of the growth in world trade.

Eastern Europe, however, has not benefited significantly from the relatively modest expansion of world trade in this decade. East-West trade, on which the CMEA-Six rely for hard currency earnings to service foreign debt and acquire Western capital goods and technology, has virtually stagnated in the 1980's. Part of the reason for this stagnation is the fact the United States, the fastest growing export market since 1982, absorbs only about 5 percent of Eastern Europe's total exports to the industrial West. Japan, the fastest growing industrial country buys even fewer Eastern exports than the United States. Western Europe accounts for over half of the CMEA-Six's exports to the industrial West, but European demand for imports has grown relatively slowly in this decade.

Another factor which has contributed to Eastern Europe's relatively poor trade performance is continuing strong competition in global markets from the NIC's. In 1970, the CMEA-Five (excluding Bulgaria) held 6 percent of the global market for manufactured exports, compared to 2.3 percent for the Asian NIC's (Hong Kong, Korea, Singapore, and Taiwan). By 1985, the CMEA-Five's share had fallen to 4.8 percent, while the Asian NIC's more than tripled their global market share to 7.9 percent.⁵

⁵ GATT, *International Trade 1986-87*, p. 194.

CMEA could pay a heavy long-term price for its weak trade performance in the 1980's. Imports of Western goods and technology have slowed significantly in this decade (Czechoslovakia and the GDR are exceptions). The Economic Commission for Europe reports that, "by the mid-1980's Eastern Europe's stock of imported Western capital was markedly older than the world average . . . the aging of the imported capital stock suggests that Eastern Europe is lagging behind most other regions in the modernization of its industries."⁶ The Commission warns of a vicious circle in which inability to buy Western capital goods and technology to modernize their economies could damage Eastern Europe's long-term international trade competitiveness and domestic growth prospects.

There have been a few relatively bright spots for Eastern Europe in the international economic environment. Oil prices fell dramatically in the middle part of the decade and, although price rebounded in 1987, the average annual world price increase for the decade was a modest 3.6 percent. In addition, Eastern Europe benefited from low world agricultural prices for most of this decade. In particular, the trade distorting agricultural policies of the Western industrial countries were a major blessing for Eastern Europe, which imports a number of subsidized grains. It is estimated that the industrial market economies' agricultural subsidies in 1985 bestowed a \$1.9 billion net welfare gain on Eastern Europe.⁷

The international economic outlook for Eastern Europe in the next few years is "more of the same." The IMF projects that world output and trade will grow relatively slowly and that real interest rates will remain in the range of 4 to 5 percent. Underlying this prognosis is an implicit assumption that the global economic imbalances of this decade will be gradually reduced and that, as a result, a severe worldwide recession will be avoided.⁸ The major uncertainty on the horizon is the willingness and ability of the major industrial powers to take the actions necessary to avoid a world recession.

The reduction of global imbalances requires, first and foremost, continuing improvement in the U.S. trade deficit, which has been falling in volume terms since 1987. The correction of the U.S. trade deficit, in turn, requires big reductions in the Government budget deficit. In order to maintain their own (and world) growth, the countries with trade surpluses must shift from export-led to domestic demand-led growth. Japan has made major progress in this adjustment, but Europe (particularly Germany) has been slow to adapt.

This fairly optimistic, "slow growth, but no recession" scenario portends a modest increase in East-West trade and financial flows. Eastern Europe's problem is a chronic hard currency constraint on its ability to buy Western goods and technology. Europe and Japan, faced with a continuing decline in their trade surpluses with the

⁶ Economic Commission for Europe, *Economic Survey of Europe in 1987-88* (New York, 1988), p. 291.

⁷ R. Tyers and K. Anderson, "Distortions in World Food Markets," *Work Bank Background Paper No. 22* (January 1986), p. 61.

⁸ For an analysis of the impact of the global imbalances and actions needed to correct them, see *Resolving the Global Economic Crisis: After Wall Street*, Institute for International Economics Special Report 6 (December 1987).

United States, will have stronger incentives to export to Eastern Europe. A decline in U.S. borrowing requirements (if the budget deficit falls) will reduce global interest rates and could stimulate lending to Eastern Europe to finance Western exports.

But this scenario could also foreshadow heightened tensions between the United States and its allies over West-East trade and lending. Under pressure from their exporters and commercial banks (who learned in the 1980's that sovereign borrowers can stop servicing their loans), European and Japanese policymakers, in particular, may consider granting direct subsidies or guarantees for loans to Eastern Europe. Moreover, Western governments will also face demands from both Eastern Europe and their own producers to increase exports of high technology goods which have dual civilian-military uses. The United States, however, is likely to oppose subsidized loans or a further relaxation of COCOM export controls. To avoid a replay of the debilitating alliance frictions of the late 1970's and early 1980's, it would be highly desirable for the allies to reach explicit agreement soon on how they will deal with Eastern Europe's need for credit and high-technology goods.

In the end, Eastern Europe's economic future will depend more on internal policy choices than on the vagaries of the international economy. The terrible irony of the 1980's for the CMEA-Six was that, having embraced international trade and financial flows as a way to modernize their economies and increase their international economic competitiveness, they found instead that they had become more vulnerable to global shocks and competition. Eastern Europe experienced all of the costs but few of the benefits of global interdependence. To restore growth and thrive in an increasingly competitive global economy, Eastern Europe must emulate the outward-oriented policies of the successful NIC's. Such policy reforms may not be palatable to Eastern Europe policymakers, but the alternative—economic stagnation—may be even worse.

A COMPARATIVE ASSESSMENT OF EAST EUROPEAN AND THIRD-WORLD DEBT

By Martin J. Kohn*

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I. INTRODUCTION AND SUMMARY

The external debt of both East Europe and the Third World to Western creditors has long been a matter of global concern. The debt accumulated and the ensuing difficulties in servicing it have adversely affected world trade, posed a threat to the stability of the international banking system, and created serious economic strains within debtor countries.

The heavy borrowing that gave rise to the debt crisis of the 1980's began in the 1970's. Initially, world attention centered on East Europe's debt servicing problems—notably those of Poland and, to some extent, Romania. In 1982, however, Mexico's announcement that it could no longer meet its debt-service obligations clearly signaled that many Third World countries, with total external debt far greater than East Europe's, were in deep financial trouble.

The question often arises whether East Europe's debt situation is unique or at least sharply differs from that of the third world. This article explores that issue, comparing the external financial position of the two groups of countries from three perspectives: size and composition of the debt; origins and causes of the debt crisis; and the manner and effectiveness with which debt problems have been handled.

*International Trade Administration, U.S. Department of Commerce. The views expressed in this paper are strictly those of the author and do not necessarily reflect those of the Department of Commerce. The author would like to express particular thanks to William F. Kolarik for his very valuable comments and suggestions, with respect to both substantive and editorial matters. The author is also grateful to Martin Veeger and Faustino Perera for their helpful comments and suggestions.

East Europe in this paper refers to the six East European Warsaw Pact countries (EE6).¹ As for the Third World, we will focus on a group of heavily indebted developing countries (LDC's) of particular importance to the United States—the 15 nations (BP15) to which the Baker Plan, the centerpiece of the U.S. strategy for dealing with the debt problem since 1985, applies.²

Regarding the central question of how the East European and Third World debt situations compare, there are significant similarities and differences. A brief summary of key findings and conclusions follows:

- The debt of the BP15 is about 4½ times larger than that of the EE6.
- Slowing economic growth in the West and escalating international interest rates played a large role in causing severe external financial problems in both the BP15 and the EE6 in the late 1970's and early 1980's.
- The BP15 and EE6 countries helped bring the debt crisis on themselves through their own unrealistic expectations about domestic economic growth prospects and export potential, unwise policy decisions, and systemic shortcomings.
- Since the onset of the crisis in the early 1980's, financial disaster in the form of outright default or debt repudiation has been averted in both the EE6 and the BP15.
- However, despite efforts by debtors and creditors alike to restore creditworthiness to financially ailing countries, debt has risen among most countries in both the BP15 and the EE6, and there has been little or no improvement in the debt-servicing capacity of most of the problem debtors in the two groups.
- But attempting to deal with debt-service difficulties has been far more burdensome for the BP15 than for the EE6. While debt-service payments have resulted in net resource outflows from both the EE6 and the BP15, the drain relative to GNP has been much greater in the BP15. Furthermore, the debt/GNP ratio is far lower, and per capita GNP much higher, in the EE6 than the BP15.
- In addition, while most BP15 countries are experiencing debt-servicing difficulties, at least three and perhaps four of the EE6 countries are currently not in external financial trouble. At present, only Poland and Hungary are clearly problem debtors. Bulgaria is a borderline case.

II. SIZE AND COMPOSITION OF DEBT

With respect to size of debt, there is clearly a marked difference between the EE6 and the BP15. The total external debt of the EE6 totaled \$94 billion at the end of 1987.³ (See Table 1.) At the same

¹ Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.

² Ten of the 15 countries—Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela—are in Latin America. The other five countries are the Ivory Coast, Morocco, Nigeria, the Philippines, and Yugoslavia. The goal of the Baker Plan (named after former Treasury Secretary James Baker) is increased lending to selected debtor LDC's by commercial banks, and multilateral lending agencies (mainly the IMF and World Bank) coupled with adoption by borrowing countries of market-oriented reforms to promote growth and balance of payments equilibrium.

³ CIA, Directorate of Intelligence, *Handbook of Economic Statistics, 1988*, September 1988, p. 43.

date, according to International Monetary fund (IMF) statistics, the long-term debt (debt with an original maturity of more than 1 year) of the BP15 was \$430 billion.⁴ Two BP15 countries—Brazil and Mexico—each have long-term debt exceeding that of the entire EE6. (See Table 2.) Debt of the BP15 inclusive of short-term debt equalled \$466 billion at end-1987.⁵

TABLE 1.—HARD CURRENCY DEBT OF 6 NON-SOVIET EAST EUROPEAN WARSAW PACT COUNTRIES, SELECTED YEARS

(In billions of dollars)

| | 1971 | 1975 | 1980 | 1981 | 1982 | 1984 | 1987 |
|----------------------|------|------|------|------|------|------|------|
| Bulgaria | 0.7 | 2.6 | 3.5 | 3.0 | 2.8 | 2.2 | 6.1 |
| Czechoslovakia | .5 | 1.1 | 4.9 | 4.5 | 4.0 | 3.6 | 5.9 |
| East Germany | 1.4 | 5.4 | 14.1 | 14.9 | 13.1 | 12.4 | 20.4 |
| Hungary | 1.1 | 3.1 | 9.1 | 8.7 | 7.7 | 8.8 | 17.7 |
| Poland | 1.1 | 8.0 | 25.0 | 25.5 | 24.8 | 26.8 | 39.2 |
| Romania | 1.2 | 2.9 | 9.4 | 10.2 | 9.8 | 7.1 | 4.9 |
| Total | 6.1 | 23.2 | 66.1 | 66.8 | 62.3 | 60.9 | 94.3 |

Source: CIA, Directorate of Intelligence, Handbook of Economic Statistics, 1988; and same for 1987.

TABLE 2.—LONG-TERM EXTERNAL DEBT OF 15 BAKER-PLAN COUNTRIES, SELECTED YEARS

(In billions of dollars)

| | 1975 | 1980 | 1981 | 1982 | 1984 | 1987 |
|-------------------|------|-------|-------|-------|-------|-------------------|
| Argentina | 4.9 | 16.8 | 22.8 | 27.1 | 37.1 | 43.5 |
| Bolivia | .8 | 2.3 | 2.8 | 2.9 | 3.5 | ¹ 4.1 |
| Brazil | 23.4 | 56.7 | 64.6 | 73.5 | 89.6 | 103.5 |
| Chile | 4.4 | 9.4 | 12.7 | 14.0 | 17.3 | 17.4 |
| Colombia | 2.9 | 5.0 | 6.2 | 7.2 | 9.4 | 15.0 |
| Ecuador | .6 | 4.4 | 5.3 | 5.7 | 6.9 | 8.9 |
| Ivory Coast | .9 | 4.9 | 5.2 | 6.5 | 7.1 | 11.3 |
| Mexico | 16.6 | 41.3 | 52.9 | 59.7 | 87.6 | 95.2 |
| Morocco | 1.8 | 7.5 | 8.4 | 9.1 | 10.6 | 16.2 |
| Nigeria | 1.4 | 5.3 | 7.5 | 10.4 | 13.1 | 26.5 |
| Peru | 4.4 | 7.4 | 7.4 | 8.6 | 10.1 | 13.0 |
| Philippines | 2.8 | 9.0 | 10.4 | 12.2 | 14.3 | 22.5 |
| Uruguay | .7 | 1.3 | 1.7 | 1.9 | 2.7 | ¹ 2.8 |
| Venezuela | 2.3 | 14.1 | 15.0 | 17.2 | 26.8 | 34.0 |
| Yugoslavia | 5.8 | 15.6 | 16.9 | 16.3 | 16.8 | ² 19.0 |
| Total | 73.7 | 201.0 | 239.8 | 272.3 | 352.9 | 432.9 |

¹ 1986. ² Estimate.

Note: Long-term debt is debt whose original maturity is over 1 year. Please note that total long-term debt is slightly larger than total given by IMF, World Economic Outlook.

Sources: World Bank, World Debt Tables: External Debt of Developing Countries, Volume II. Country Tables, 1987-88 edition; CIA, Handbook of Economic Statistics, 1988; same for 1987.

The debt of the EE6 seems even less significant relative to BP15 debt if East European countries that do not appear to be having debt-servicing difficulties are excluded. Only Poland has consistent-

⁴ IMF, *World Economic Outlook*, April 1988, p. 106 and p. 178.

⁵ The BP15 by no means include all of the Third World's financially troubled countries. The IMF categorizes 65 developing countries (LDC's) as having had recent debt-servicing problems. The long-term and total external debt of these 65 countries at the end of 1987 equalled \$610 and \$670 billion, respectively. On the other hand, many Third World debtors, accounting for about half of total LDC debt of about \$1.2 trillion, are successfully coping with their debt-service obligations. (See IMF, *World Economic Outlook*, *op. cit.*, p. 104, 174, and 177.)

ly had trouble meeting its debt-servicing obligation, and, at present, in addition to Poland, only Hungary clearly belongs in the financially ailing category. The recent rapid rise in Bulgaria's debt suggests that it might be heading for trouble. The combined external debt of these three countries at end-1987 was \$63 billion, with Poland accounting for over 60 percent of that amount. The bottom line, then, is that the EE6, relative to the BP15 and other troubled LDC debtor nations is a comparatively small threat to the international financial system under any foreseeable scenario.

Further buttressing this conclusion is the fact that the share of commercial debt—most of it owed to commercial banks—in total debt is smaller for East Europe in comparison with the BP15. At end-1987, commercial debt accounted for almost 75 percent of total BP15 debt, but slightly less than 60 percent of total EE6 debt. For a given amount of debt, the higher the share of debt owed to governments and international financial institutions by troubled borrowers, the less vulnerable the international financial system is likely to be to cessation or suspension of debt-service payments.

U.S. bank exposure to Eastern Europe is minimal. Of the approximately \$43.5 billion in commercial bank loans to the Eastern European six at the end of 1986, only \$1.5 billion—or 3 percent—was held by U.S. banks. This is in sharp contrast to heavy U.S. bank lending to the Baker 15. In December 1986, U.S. bank claims on these countries totaled about \$86 billion, nearly 30 percent of the slightly more than \$300 billion lent to them by all banks.⁶

III. ORIGINS AND CAUSES OF CRISIS

Many of the reasons why the EE6 and the BP15 fell into severe financial distress are strikingly similar. The heavy borrowing that set the stage for the subsequent crisis owed much to the eagerness of Western commercial banks in the 1970's to lend. Under pressure to recycle funds placed with them by OPEC countries after oil prices skyrocketed in 1973-74, banks sought out borrowers everywhere, including East Europe and the Third World.

In general, neither bankers nor borrowers perceived any great risk in sharply expanding borrowing. In the inflationary climate of the second half of the 1970's, with Western governments pursuing expansionary policies to counter the depressing impact on domestic demand of the oil price hikes, both Third World and Eastern European countries were confident of their capacity to service debt. The cost of credit, in real terms, was not high, and prospects for favorable terms of trade—and thus for high earnings from exports—seemed bright. Furthermore, the ready availability of syndicated loans in the 1970's, essentially on a no-strings-attached, no-questions-asked basis, made it relatively easy to borrow and reinforced the temptation to do so.

Banks' willingness to lend to the EE6 was strengthened by their faith in the so-called "umbrella theory." The theory held that—to safeguard its own creditworthiness and that of its Warsaw Pact allies—the Soviet Union would bail out any EE6 country that

⁶ Morgan Guarantee Trust Co., International Economics Department, *Morgan International Data*, December 1987.

proved unable to meet its debt service obligations. Banks were also generally confident that the high degree of control over foreign trade in the nonmarket economies of the EE6 would permit these countries to deal with any debt-servicing emergencies that might arise.

Both East Europe and the Third World were similarly and powerfully motivated to borrow, moreover. Countries in each group saw bank loans as a safe and efficient way to finance development while maintaining consumption at politically acceptable levels.

Jan Vanous, in a 1985 article, cited several specific factors that spurred the EE6 to borrow in the second half of the 1970's, including (a) the drive to modernize and stimulate economic growth through imports of Western technology at a time when rising Soviet energy prices were causing a deterioration in the EE6's terms of trade with the U.S.S.R.; (b) the need for complementary imports for the Western technology being purchased; and (c) pressure to import food—particularly evident in Poland—to maintain or boost living standards.⁷

The leap in oil prices in 1973-74 and the expectation that oil prices would go on rising stimulated borrowing, particularly among LDC's. With loans on favorable terms easily accessible, oil importing countries in the Third World borrowed to finance oil deficits. Oil exporting LDC's also borrowed heavily, assuming that high-priced oil exports would indefinitely insure their debt-servicing capacity.

The transformation of the borrowing binge into a financial crisis began, for East Europe and the Third World alike, with the quantum jump in oil prices in 1979. The price hikes—by restraining demand in much the same way that imposition of a sales tax might—contributed to a growth slowdown in the industrialized West. Restrictive measures instituted by Western governments to combat inflationary effects of the price rises further aggravated the slowdown. Inflation accompanied by tight monetary policy in many Western countries also caused interest rates to soar. The combination of slackening demand in the West and escalating international interest rates made it far more burdensome for both the EE6 and the BP15 to service their external debt.

Though victimized by adverse exogenous developments, both the EE6 and BP15 contributed to their own financial predicament. Countries in both groups had unrealistic expectations about prospects for sustained economic growth and their capacity for generating export revenues—the key to maintaining debt-service payments. Systemic deficiencies and unwise policies—though often of a different nature—also contributed to foreign debt problems in the EE6 and BP15.

In Eastern Europe, the rigidities and misallocation of resources seemingly endemic to centrally planned economics both inhibited growth and hampered efforts to export manufactured goods to the West on a large scale. Low quality of output and lack of marketing

⁷ Jan Vanous, "Macroeconomic Adjustments in Eastern Europe in 1981-83: Response to Western Credit Squeeze and Deteriorating Terms of Trade With the Soviet Union," in Joint Economic Committee, Congress of the United States, *East European Economies: Slow Growth in the 1980's*, Volume 1. *Economic Performance and Policy*, October 28, 1985, p. 24-25.

skills were major obstacles to these efforts. In addition, heavy investments were made in projects with limited near-term export potential.

In many Third World countries, the highly interrelated variables of inflationary fiscal policy, overvalued exchange rates, and capital flight were prime culprits in the emergence of the debt crisis. Typically, large government deficits in LDC's—usually amounting to sizeable shares of GNP—gave rise, or were a prime contributor, to severe inflation. Inflation and the desire to combat it often drove governments to maintain overvalued exchange rates. The combination of overall economic instability, overvalued exchange rates and widespread expectations that overvalued rates could not be maintained indefinitely generated capital flight from many debtor countries, including major ones such as Mexico, Argentina, and Venezuela. Inflation and overvaluation played a large role in holding down exports and putting upward pressure on imports, with adverse consequences for the trade balance that necessitated borrowing from abroad. Capital flight itself forced more borrowing than would otherwise have taken place. (The direction of causation worked the other way, too. Excessive borrowing caused nervousness that led to capital flight.)

The cluster of phenomena just described was largely absent in Eastern Europe. Government deficits occur in Eastern Europe, and inflation—particularly of the “hidden” or “suppressed” variety—is common there. However, deficits and inflation rates were generally not of the same order of magnitude in Eastern Europe as in much of the Third World. Furthermore, reflecting the tight control of Eastern European governments over the external financial dealings of their citizens, capital flight was largely absent. Finally, because of the large degree of administrative control over foreign trade, exchange rates did not play a decisive role in determining exports and imports in Eastern Europe.

A major difference between the EE6 and BP15 was that a genuine threat of insolvency was much more pervasive and played a greater role in precipitating a financial crisis among the latter than the former. Poland and Romania were the only EE6 countries unable to manage their debt-servicing obligations to the West in the early 1980's. The financial squeeze spread to the other four countries largely because of cutbacks in Western bank lending. Reduced lending—to a large extent reflecting political considerations, notably the Soviet invasion of Afghanistan at the end of 1979—predated the climactic event of Poland's declaration in early 1981 that it could no longer continue to meet its payment obligations.⁸

Meanwhile, substantial bank lending to the Third World continued, reflecting optimism in the early 1980's that world economic conditions would shortly improve, to the benefit of the debt-servicing capacity of LDC's. In addition, a large portion of the banks' loans to LDC's were to central banks or other government agencies. Such loans, the banks reasoned, were inherently safe because “countries, unlike companies, can't go bankrupt.” The death blow

⁸ Allen E. Clapp and Harvey Shapiro, “Financial Crisis in Eastern Europe,” Joint Economic Committee, *East European Economies: Slow Growth in the 1980's op. cit.*, Volume 2, *Foreign Trade and International Finance*, p. 245-246.

to this view and thus to market-based or "voluntary" lending to debt-burdened LDC's—and the proximate cause of the Third World debt crisis—was Mexico's announcement in August 1982 that it could no longer meet its payment obligations. The announcement had a domino effect that severely curtailed access of many LDC's to credit markets.

IV. HOW THE CRISIS HAS BEEN HANDLED

A. FINANCIAL DISASTER AVERTED

On the positive side, among both the EE6 and the BP15, financial disaster—in the form of outright default or debt repudiation—has been avoided. Furthermore, the world banking system, far from collapsing, has grown stronger in recent years. In large measure in response to the demonstrated difficulty of several Third World countries to service their debts, banks in the United States and abroad have built up their capital. Capital-asset ratios are substantially higher today than in the early 1980's.

In emergencies, EE6 and BP15 debtor countries and their Western creditors have sought and reached accommodation. All parties have recognized that default and repudiation would inflict serious damage on debtors and creditors alike. Banks—often in conjunction with assistance provided by the governments of their countries and international lending agencies—have worked out debt-rescheduling arrangements with and sometimes extended new loans to debtor countries. Such arrangements have been far more common with Third World countries than with East Europe. But Poland has regularly rescheduled since 1981, and Romania concluded rescheduling agreements in 1982 and 1983.⁹

The assumption underlying these arrangements has been that, in return for creditor concessions, debtor countries would take steps to restore creditworthiness. The concessions would include deferral of debt service payments and extension of new loans by banks and official lenders. (The bank loans were termed "involuntary" because many banks that preferred to refrain from further lending to debtor nations were pressured by governments and other banks to participate in rescue packages.)

Debtor actions would include immediate efforts to boost exports and restrict imports and introduction of economic reforms that would enhance economic efficiency and competitiveness.

The hope has been that debtor countries would improve their current accounts and make their economies more efficient, thereby rebuilding creditor confidence and leading banks to renew voluntary lending.

B. DIFFERENT PATTERNS OF DEALING WITH CRISIS

Notwithstanding many similarities, there have been significant differences in how Western financial relations with the EE6 and BP15 have evolved. Bank loans to the BP15 have steadily risen

⁹ Analysts of the Central Intelligence Agency, "Eastern Europe Faces Up to the Debt Crisis," Joint Economic Committee, Congress of the United States, *East European Economies: Slow Growth in the 1980's*, Volume 2. *Foreign Trade and International Finance*, March 28, 1986, p. 165.

during the 1980's. For their part, most financially ailing Third World countries—striving to restore their creditworthiness—have substantially improved their trade balances, mainly through drastic import cuts. In the 1980–84 period, East Europe likewise substantially bettered its trade balance, also largely through import cuts. The reduction in EE6 purchases from the West, however, was necessitated by a sharp curtailment in lending by Western banks. After 1984, bank lending to the EE6 steadily and substantially increased, and East Europe's imports from the West surged, causing a sizable deterioration in East Europe's trade balance with the West.

Loans to the BP15 from commercial banks that report to the Bank for International Settlements (BIS) rose by 23 percent in 1981–87.¹⁰ During the same period, the BP15 engineered a sizable improvement in their trade balance. In 1981, these countries ran a collective trade deficit of \$6.5 billion. In 3 years, the deficit moved to a surplus of \$42 billion and remained above \$40 billion in 1985. The oil price collapse—sharply reducing the value of Mexican, Venezuelan and Nigerian exports—cut the surplus roughly in half in 1986. The trade balance improved again in 1987, ending up \$28 billion in the black.

The improvement in the BP15's trade balance stemmed from a steep decrease in imports, which were 37 percent lower in 1987 than in 1981. The fall in imports more than offset a decline in exports, which in 1987 were 12 percent below their 1981 level. The overall current account balance improved from a deficit of \$50 billion in 1981 to a deficit of only about \$8 billion in 1987.¹¹ The current account benefited from a steady reduction in interest payments after 1984 that resulted from falling international interest rates.

In contrast to the uninterrupted rise in outstanding bank claims on BP15 countries—which indicated that new lending was taking place—bank loans to the EE6, measured in dollars, plunged by over 33 percent from end-1980 to end-1984.¹² Only a part of the drop reflected valuation effects of the appreciation of the dollar during this period. (The effect of the rising dollar was to reduce the dollar value of loans made in other currencies, which account for a substantial share of the international borrowing of the EE6.) The EE6 responded to the credit squeeze by slashing imports from the West, which fell from \$26.1 billion in 1980 to \$18.3 billion in 1984—a drop of about 30 percent. The value of exports was virtually the same—a little over \$22 billion—in both years.¹³

Western bank lending to the EE6 sharply increased after 1984. Claims on these countries rose by 48 percent from end-1984 to end-1987. Loans by BIS-reporting banks at the end of 1987 totaled \$45.7 billion, just slightly below the end-1980 figure of \$46.3 billion.¹⁴ The revival of Western bank lending was accompanied by a surge in EE6 imports from the West. Such imports for the EE6 minus Romania—for which reliable statistics for 1986 and 1987 are not

¹⁰ BIS reports, "The Maturity Distribution of International Bank Lending."

¹¹ IMF, *World Economic Outlook*, April 1988, *op cit.*, p. 156.

¹² BIS reports, "The Maturity Distribution of International Bank Lending," *op. cit.*

¹³ *Handbook of Economic Statistics, 1988*, *op. cit.*, p. 167–169.

¹⁴ BIS reports, "The Maturity Distribution of International Bank Lending," *op. cit.*

available—rose by about 45 percent from 1984 to 1987, outpacing a 20 percent advance in exports to the West. As a result, a surplus for the five countries of \$1.5 billion in 1984 gave way to a deficit of \$2.4 billion in 1987.¹⁵ (Romania's trade balance appears to have deteriorated in 1986–87 but at a slower rate than for the other five combined and reportedly remained in surplus in 1987. Earlier, from 1980 to 1984, Romania's imports from the developed West fell by a spectacular 62 percent.)¹⁶

C. LDC'S HARDER HIT BY CRISIS

Dealing with external financial problems during the 1980's has been costly for both the BP15 and the EE6. Efforts to meet debt-service obligations and restore or preserve creditworthiness have contributed to slowing economic growth and a decline in the share of GNP allocated to capital investment for both groups. In the process, both groups have suffered net resource outflows. Furthermore, despite their exertions, the debt to the West of both groups of countries was higher at the end of 1987 than at the beginning of the 1980's. However, for reasons discussed below, the economic and financial toll seems to have been considerably greater for the BP15.

Though the rate of increase has slowed, the external debt of the BP15 has steadily risen since the crisis erupted in 1982. Despite the generally strenuous and successful efforts of these countries to improve their trade balances, their long-term external debt rose 43 percent in the 5 years from end-1982 to end-1987—an average annual rate of increase of over 7 percent.¹⁷

The increase has not been accompanied by a corresponding strengthening of the capacity of the BP15 to service their debt. The stagnation in BP15 exports has already been noted. The ratio of external debt to gross domestic product (GDP) has continuously moved up since the debt crisis began, from 42 percent in 1982 to 48 percent in 1987.¹⁸ The ratio of debt service payments—interest payments plus repayment of principal on long-term debt—to exports of goods and services has not materially declined since 1982. This important barometer of the strain on a country's resources imposed by debt-service obligations rose from about 23 percent in 1981 to about 30 percent in 1982. By 1986, despite widespread re-schedulings, the ratio had fallen only slightly to about 28 percent. A sharp decline did take place in 1987, to about 22 percent, but the decrease did not reflect a fundamental easing of the debt burden.¹⁹ Instead, it was due primarily to Brazil's unilaterally declared moratorium on debt service payments early that year. A year later, chastened by the political and economic damage it had inflicted on itself by this action, Brazil abandoned the moratorium.

The rise in the debt of the BP15 is primarily due to ongoing borrowing to cover continuing sizable current account deficits, which stem largely from heavy interest payments on past debt accumulated. (Though it remained onerous, the interest-payment burden was

¹⁵ *Handbook of Economic Statistics, 1988, op. cit.*, p. 167–169.

¹⁶ *Ibid.* and PlanEcon, PlanEcon Report, "Romanian Economic Performance in 1987," March 4, 1988.

¹⁷ IMF, *World Economic Outlook, op. cit.*, p. 178.

¹⁸ *Ibid.*, p. 181.

¹⁹ *Ibid.*, p. 183.

eased by the post-1984 decline in international interest rates. Indeed, the drop in interest rates was the most important source of generalized debt-servicing relief since the crisis began.) Another reason for the debt buildup is borrowing needed to offset the financial drain caused by capital flight.

External debt has not steadily risen in East Europe. From end-1980 to end-1984, it fell by about 8 percent, from \$66 billion to \$61 billion. The reasons for the decline—the reduction in imports in large measure induced by a Western credit squeeze and the valuation effects of an appreciating dollar—have already been noted. From end-1984 to end-1987, external debt rose rapidly, by about 55 percent to \$94 billion. The only country whose debt continued to fall in 1984–87 was Romania, reflecting draconian resource diversion to net exports that might well be politically impossible in any other East European country.

The evolution of EE6 debt ratios presents a mixed picture. The ratio of debt-service payments to current account receipts fell for all East European countries except Hungary from 1981 to 1984. In the subsequent 3 years, it fell for Czechoslovakia (from 20 to 17 percent) and for East Germany (from 28 to 27 percent). On the other hand, the ratio rose from 13 to 26 percent for Bulgaria and from 44 to 51 percent for Hungary. Poland is a special case. Its debt-service ratio has been falling steadily, from 51 percent in 1981 to 23 percent in 1984 to 17 percent in 1987.²⁰ But the decline, rather than demonstrating an improving financial position, reflects both the constant debt rescheduling Poland has been granted and the fact that Poland has been only partially meeting its interest payment obligations. Except for Romania, which rescheduled in 1982 and 1983, Poland is the only one of the EE6 to formally reschedule its debt. (Data on Romania's debt-service ratio is not available, but—with Romanian debt rapidly shrinking—the ratio clearly has been decreasing.)

The debt/GNP ratio for the EE6 has been on the rise but is low compared with the ratio for the BP15. Though it has been rising, the ratio for the EE6 in 1987 was only a little over 10 percent—well below the almost 50-percent debt/GNP ratio for the BP15.²¹

The reasons behind the rise in East European debt from 1984 to 1987 are different from those responsible for the increase in the BP15 debt. Three factors stand out. First, as noted above, merchandise imports from the West surged. Second, many of the countries in East Europe exported heavily to Third World countries, particularly arms and machinery to the Middle East. These exports were generally made on credit. Consequently, to obtain cash in advance of expected payments, the EE6 exporting countries borrowed in the West. It merits attention that the loans the EE6 countries made to these Third World buyers are very risky. Third, the depreciation of the dollar that started in early 1985 boosted the dollar value of that portion of East Europe's debt that is denominated in nondollar currencies. Since dollar-denominated claims make up a relatively

²⁰These ratios are from PlanEcon reports entitled "Trade and Finance Review." The data on Bulgaria, Czechoslovakia, East Germany, and Hungary appeared in reports published in July 1988. The figures on Poland were in a report published in September 1988.

²¹GNP (or GDP) figures are taken from Central Intelligence Agency, *The World Factbook 1988*. The debt figures are from Handbook of Economic Statistics, 1988, *op. cit.*

small share of East European debt (in contrast to most LDC's, whose debt is predominantly in dollars), the substantial decline of the dollar gave a sizable boost to East Europe's debt expressed in dollars.²²

It should be noted that the decline of the dollar, apart from boosting the size of the debt in dollar terms, has also placed an increased financial strain on those countries that have substantial dollar-based investments and earn a large part of their hard currency in dollars. The most striking example of a country hard hit by the depreciation of the dollar was Hungary. Hungary's financial authorities bet incorrectly on the direction the dollar would take in recent years and borrowed heavily in marks, yen, and other currencies that appreciated against the dollar and invested in dollar assets.²³

East Germany's debt rose in 1984-87 for a fourth reason. The GDR borrowed heavily in the West to increase its reserves, thus markedly boosting its gross debt but only marginally upping its net debt.²⁴

There are clear indications that external financial difficulties have imposed strains on the domestic economies of both the BP15 and the EE6. In the BP15, real GNP declined in 1982 and 1983 and in 1984-87 grew at an average annual rate of only 2.6 percent. In the 1970's real GNP growth averaged almost 6 percent annually.²⁵ In Eastern Europe, real GNP growth slowed to an average annual rate of only 1.2 percent in 1981-85, down from the already anemic average annual rate of 1.9 percent in 1976-80. Growth picked up in 1986, rising to 3 percent, but fell back to 0.6 percent in 1987.²⁶ The causes of slow and slowing growth are many and complex, but the belt-tightening and diversion of resources to meet debt-servicing requirements and deal with liquidity squeezes have been a major contributor to reduced rates of expansion.

Debt-service burdens and other external financial pressures not only inhibit present growth but—because, largely for political reasons, they foster reductions in the share of GNP allocated to investment—can impair future growth as well. In the BP15, from 1973 to 1980, investment accounted for 25.5 percent of GNP. In 1983-87, the share shrank to 17.8 percent.²⁷ As an IMF economist observed in a recent analysis of developing countries, "When financing dried up in the 1980's, investment bore a disproportionate share of the adjustment burden. Investment was most adversely affected in the countries that experienced debt-servicing problems."²⁸ Sacrificing investment rather than consumption to deal with debt-servicing needs is not limited to LDC's. East European countries during the first half of the 1980's also cut investment, both in absolute terms and as a share of GNP, in response to external shocks.²⁹ The basic

²² The discussion in this paragraph draws heavily on the PlanEcon reports cited in footnote 20.

²³ See PlanEcon Report, Volume IV, No. 7, "Hungarian Economic Performance in 1987," Feb. 18, 1988, p. 16-17.

²⁴ See PlanEcon Report, Volume IV, Nos. 24-25, "Developments in Soviet and East European Debt to BIS-Area Commercial Banks Between 1974 and 1987," June 17, 1988, p. 13.

²⁵ IMF, *World Economic Outlook*, *op. cit.*, p. 116.

²⁶ *Handbook of Economic Statistics, 1988*, *op. cit.*, p. 33.

²⁷ IMF, *World Economic Outlook*, *op. cit.*, p. 118.

²⁸ *Ibid.*, p. 76.

²⁹ See Vanous, "Macroeconomic Adjustment in Eastern Europe in 1981-83," *op. cit.*

reason why investment is likely to bear the brunt of the shift of resources to net exports is political: Leaders do not want to risk the popular discontent that cuts in consumption would generate.

Servicing external debt obligations has subjected both the BP15 and EE6 to a drain of resources. Table 3 indicates the size of the drain for the BP15 in recent years.

TABLE 3.—NET CAPITAL INFLOWS MINUS INTEREST PAYMENTS, 15 BAKER-PLAN COUNTRIES

| | [In billions of dollars] | | | | | | |
|--------------------------|--------------------------|------|-------|-------|-------|-------|-------|
| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
| Net capital inflows..... | 51.0 | 51.2 | 15.9 | 1.8 | 1.1 | 15.3 | 8.1 |
| Interest payments..... | 37.8 | 45.9 | 41.5 | 46.1 | 44.8 | 39.4 | 36.7 |
| Difference..... | 13.2 | 5.3 | -25.6 | -44.3 | -43.7 | -24.1 | -28.6 |

Source: IMF, World Economic Outlook, April 1988, pp. 156 and 167.

What the above table shows is that for 5 consecutive years starting in 1983, foreign lenders and other investors received more resources from the BP15 than they put into the BP15. The net outflow was high relative to GNP—in 1987, for example, about 3 percent of the combined GNP of the BP15 countries. The outward flow also seems to be at cross purposes with the goal of having these countries “grow out of” their debt problems. Accumulating productive capacity that might enable them to do so would appear to require net resource inflows.

The EE6 has also experienced a resource drain, amounting to about \$4 billion in 1987. This, however, is equal to only about 0.5 percent of East European GNP, suggesting that debt-service payments are far less of a burden for the EE6 than for the BP15.

There are several other indications that the EE6's external debt situation is far less onerous than that of the BP15. The combined GNP of both groups in 1987 was roughly the same—slightly less than \$900 billion. But the debt/GNP ratios of the two groups were vastly different—almost 50 percent for the BP15, only a little over 10 percent for the EE6. Furthermore, with per capita GNP in the BP15 much lower than in the EE6, even equal debt/GNP ratios would imply a heavier burden for the BP15. Per capita GNP in the EE6 ranges from about \$6,000 for Romania to over \$11,000 for East Germany. With the exception of Yugoslavia—with a per capita income slightly over \$6,000—the maximum per capita income among the BP15 is about \$3,000, for Venezuela. For 6 of the 15, per capita GNP is below \$1,000.³⁰

It should also be noted that virtually all of the BP15 countries are encountering difficulties in servicing their external debts. By contrast, at most three and probably only two of the EE6 can be classified as problem debtors. Though its economy is in a precarious state—in part because of its debt-reduction policy—Romania has cut its debt so drastically that servicing it has ceased to be a problem. East Germany, which has consistently run a current account surplus, built up its foreign exchange reserves, and is backstopped by its special relationship with West Germany, is likewise

³⁰ Per capita GNP figures come from *The World Factbook 1988, op. cit.*

free of debt-servicing difficulties. Czechoslovakia has consistently shunned large-scale borrowing from the West, and its debt burden is so small—and its credit rating so high—that Western banks are eager to lend to it.³¹

Of the other three EE6 countries, Hungary and Poland are mired in serious debt-servicing difficulties. Hungary's hard currency debt doubled from end-1984 to end-1987. Its hard-currency current account, in surplus in 1983 and 1984, ran substantial deficits in 1985–87. Its debt-service ratio doubled from 1983 to 1986, when it reached 68 percent. It fell back in 1987 but—at over 50 percent—was still dangerously high.³²

Poland's debt likewise mounted rapidly in 1984–87, from \$27 billion to \$39 billion. Its hard-currency current account remained in deficit in 1985–87. The intractable nature of its financial plight is indicated by the fact that in 1987 it actually paid less than \$1 billion of the \$3 billion in hard currency interest owed. The remainder was rescheduled.³³

Bulgaria might be moving into serious external financial difficulties. Its hard currency debt almost tripled from end-1984 to end-1987, as its hard currency trade balance markedly deteriorated in 1985–87 because of steeply rising imports and falling exports. Furthermore, trade credits Bulgaria has been extending on a large scale to its Third World customers are viewed as highly risky. For now, however, Western bankers evidently do not view Bulgaria as a poor credit risk. Though its debt-services ratio doubled in 1985–87, the ratio in 1987 was still relatively low—26 percent.³⁴ But avoidance of a crisis probably requires reversal of recent trade and lending patterns.

³¹ See PlanEcon "Trade and Finance Review" for Czechoslovakia, July 1988, p. 5.

³² See PlanEcon "Trade and Finance Review" for Hungary, July 1988.

³³ See PlanEcon "Trade and Finance Review" for Poland, September 1988.

³⁴ See PlanEcon "Trade and Finance Review" for Bulgaria, July 1988.

PERESTROIKA AND INTERDEPENDENCE: IMPLICATIONS FOR EASTERN EUROPE*

By John P. Hardt and Jean F. Boone*

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I. OVERVIEW OF SOVIET PERESTROIKA AND INTERDEPENDENCE

The Soviet Union's course toward perestroika and interdependence was initiated with Mikhail Gorbachev's rise to power in March 1985, and has gained momentum with the Central Committee Plenum of June 1987 and the 19th Party Conference in June 1988. During this period, a Soviet strategy for modernization and tactical initiatives of economic and political reform have been developed, yet little detailed implementation has occurred to date and the tangible economic benefits from change have been minimal. For the six East European members of the Council for Mutual Economic Assistance (CMEA), Yugoslavia, Albania and even the People's Republic of China, some of which began moving toward reform, restructuring, and renewal long before the Soviet Union, the changes in Soviet policy may hold some limited interest as a comparative model. More importantly, though, these changes in the U.S.S.R. serve to remove some of the constraints on the other socialist countries' domestic and foreign economic development posed by traditional Marxist-Leninist ideology and Stalinist institutions.¹ The use of market forces in the economy, greater pluralism in the body politic, and openness in foreign trading relations are all being actively encouraged in the new environment.

While the umbrella of Soviet policy change might release East European forces favoring reform, the lack of implementation and success in the U.S.S.R. to date has restrained the wholesale adoption by many East European leaderships of Gorbachev's new route to development. Moreover, although the countries of Eastern Europe may now be free to adopt perestroika and interdependence and to pursue such reforms in their own way, Soviet material assistance in successful implementation of the new model has been

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¹ For a discussion by a leading Soviet economist on the significance of perestroika for Eastern Europe, see Oleg Bogomolov, "Mir sotsializma na puti perestroiki," *Kommunist*, No. 16, 1987, pp. 92-102.

neither promised nor forthcoming. In order to see the more specific implications for Eastern Europe of new Soviet policies, it is useful to consider the elements that comprise Gorbachev's interlinked strategies of perestroika in the domestic sphere and interdependence in foreign economic relations.

II. GORBACHEV'S DOMESTIC STRATEGY: REFORM, RESTRUCTURING, AND RENEWAL

The implementation in the U.S.S.R. of perestroika has been limited to date and its relevance for the East European economies is open to question as each reacts and responds in a different way. Despite the lack of concrete implementation, the main elements of perestroika—reform, restructuring and renewal—have been described in rhetoric and, as described, pose both opportunities and dilemmas for Eastern Europe.²

ECONOMIC REFORM

In the Soviet Union, economic reform initiatives may be seen as proceeding along five fronts: decentralization of management to the enterprises; monetization of the economy; reduction of the central bureaucracy; changing the economic management role of the regional party; and enhanced central leadership in strategic planning and guidance. Small East European economies with diverse experience, resource endowments and economic development levels objectively find the various aspects of Soviet economic reform of different significance. Moreover, the older leaders with records developed in the Khrushchev and Brezhnev periods have institutional baggage that limits their flexibility in adopting Gorbachev's democratization and glasnost principles. Still, the changes being undertaken in the U.S.S.R. may offer a basis for comparison with East European efforts.

Decentralization of Management to the Enterprise.—A plan has been laid out for shifting micro-management responsibility from the central bureaucracy to the enterprise and family unit at the factory and farm. The industrial enterprise is to be self-financing, self-managing and self-sufficient. Bankruptcy is possible; monopolies are to be broken. Family farms and contractors on collective farms are to have rights to control property and receive income based on productivity. Cooperative units are being encouraged in industry and agriculture. Implementation of this reform in management has been marginal to date.

Monetization of the Economy.—Through fiscal and monetary reform, profit is to become the success measure of enterprises and productivity the guide to incomes policy. However, price reform involving significant austerity has been rejected as a first step. Emphasis is currently on increased supplies of food, medical services, housing, and entrepreneurial cooperatives. Sharp reduction of sub-

² Gorbachev's program for economic and political reform has been elaborated in the Basic Documents approved at June 1987 Plenum of the CPSU Central Committee (*O korennoi perestroike upravleniya ekonomikoi: sbornik dokumentov*, Moscow: Polizdat, 1987); also in the Proceedings of the 19th Extraordinary Party Conference of June 1988, published in *Pravda*, June 29–July 2. A comprehensive assessment of reform proposals can also be found in Ed Hewett, *Reforming the Soviet Economy: Equality versus Efficiency*. Washington, DC.: The Brookings Institution, 1988.

sidies on meat and other domestic hard goods is being deferred until the availability of goods and services improves.

Reduction of the Central Bureaucracy.—The shifting of management power from center to enterprise requires a reduction in personnel at the center. Consolidation of ministerial administration through horizontal integration is a further means for releasing personnel as in the projected plan for agriculture. Some retirement and shifting of personnel has occurred but substantial reassignment and retraining are apparently to occur through a gradual process.

Changing the Economic Management Role of the Regional Party.—Professionalization of economic management and shift of responsibility to technical, efficiency-oriented managers requires a redefinition of Party roles and personnel. A key question after the Party Conference is whether allowing the same person to serve both as local Party first secretary and chairman of the local soviet will take the Party out of day-to-day management of enterprises and collective farms and transform Party leaders to supporters of perestroika.

Enhanced Central Leadership Role in Strategic Planning and Guidance.—As responsibility for management devolves to the region and locality, increased responsibility for strategy and oversight by the top leadership is required; the leadership must establish a consensus and generate support for perestroika through glasnost and democratization. The involvement of the General Secretary and individual members of the Politburo in reform initiatives may be strengthened by creation of the new economic commission of the Central Committee of the Party. The increased power and responsibility of the Chairman of the Council of Ministers, with expanded staff, permits more authority for subordinating the ministries. Establishment of the new position of President could strengthen government authority and legislative power. As the summit of power in the U.S.S.R. is strengthened, it is increasingly clear that the reform is to be implemented from top down.

ECONOMIC RESTRUCTURING

In addition to changes in economic mechanisms and organization, perestroika also involves restructuring economic production and priorities. Beginning with the 12th Five Year Plan, Gorbachev has placed a high priority on re-equipping out-dated plants, modernizing existing capacity rather than investing in new, additional capacity. Furthermore, shifts in economic resources from military production to consumer goods and light industry appear to be taking place, as the military-industrial ministries are increasingly being charged with supporting civilian production. For example, the Minister of Medium Machine Building (a military-industrial ministry), Lev Ryabov, explained in an interview in *Izvestia* that the ministry has been made responsible for 10 dairy processing equipment enterprises previously under the Ministry of Machine Building for Light and Food Industries. Without receiving any additional investment funds, the defense ministry must modernize and rebuild the dairy processing industry, suggesting that a smaller proportion of its resources will be available for defense-related

production.³ The modernization of industry is crucial for improving the efficiency of Soviet production in terms of material, energy, and labor resources, while shifts in investment may serve to bolster popular support for perestroika and promote more balanced growth.

RENEWAL

In addition to Gorbachev's initiatives for political reform—democratization and glasnost—renewal refers to the attempt to return to the Leninist roots of the Soviet model. Leninist concepts as utilized by Gorbachev would preserve the leading role of the Communist party and the strategic role of the central leadership in economic planning. The democratic centralism of Lenin, as interpreted by Gorbachev, would direct and constrain democratization and glasnost. The Eastern European countries, however, do not share Gorbachev's affinity to the first Russian leader's model for developing the Soviet state. Their historical, ideological and emotional roots are not found in the reformist Lenin of 1919–21. Freed to make revolutionary changes in their systems, East Europeans might adhere to the voices of Rosa Luxemburg, the Polish Bund, Thomas Masaryk, John Hus, Imre Nagy, and others. The difference between Czechoslovakia in 1968 and the Soviet Union in 1988 is more than 20 years—it is a different historical heritage. Soviet glasnost calls for dealing with the “blank” spots in Soviet-East European shared history, but Gorbachev may be sorrier than Pandora if these nationalist sore spots are opened and discussed.

III. GORBACHEV'S INTERDEPENDENCE: CHANGES IN POLICY BUT NOT IN PERFORMANCE^{3a}

To support and complement his domestic economic policy of *perestroika*, Gorbachev has adopted a new foreign economic policy of interdependence. Noting that the U.S.S.R. has not in the past sustained “a position in international trade that would be commensurate with its economic potential and political status, particularly in light of the global revolution in science and technology,” Ivan Ivanov, Deputy Chairman of the State Commission on Foreign Economic Relations, describes the new foreign economic strategy as “a vital ingredient of the economic reforms now under way.”⁴ The new policy, as articulated by Gorbachev and other Soviet officials, includes the objectives of increased merchandise trade with the developed West; more balanced hard goods trade with CMEA countries, and more commercial trade—and less aid—to the developing countries. Just as the key to domestic modernization success centers on production of more goods of world quality, obtaining more hard goods imports may be seen as the key to Gorbachev's success

³ Interview with Lev Ryabov, *Izvestia*, Nov. 9, 1988. According to this interview, the Ministry of Medium Machine Building in 1988 will have produced 187 million rubles worth of consumer goods; this civilian production is to grow to 1.2 billion rubles by 2000.

^{3a} See John P. Hardt and Jean F. Boone, “The Soviet Union's Trade Policy,” *Current History*, October 1988.

⁴ Ivan D. Ivanov, “Restructuring the Mechanism of Foreign Economic Relations of the U.S.S.R.,” *Soviet Economy*, vol. 3, No. 3 (July-September 1987), p. 196. See also Ivanov, “The Soviet Union in a Changing Global Economic Setting: The Prospects for Trade Oriented Growth,” paper prepared for United Nations, Apr. 25, 1986.

in foreign commerce. Performance in the foreign trade sector has not, however, conformed to these stated changes in policy. Rather, factors external to Gorbachev's interdependence policy appear to have driven trade more than policy in the period from 1985-87. (See Table 1.)

TABLE 1.—PERFORMANCE BY REGION

[In millions]

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 ¹ |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|-------------------|
| Total: | | | | | | | | | |
| Export (rubles) | 49,634.5 | 57,107.8 | 63,165.0 | 67,890.6 | 74,385.8 | 72,663.7 | 68,343.1 | 68,141.8 | 32,993.0 |
| Import (rubles) | 44,462.8 | 52,631.4 | 56,411.0 | 59,589.2 | 65,373.2 | 69,429.2 | 62,587.1 | 60,740.3 | 33,367.1 |
| Trade balance..... | 5,171.7 | 4,476.5 | 6,754.0 | 8,301.4 | 9,012.0 | 3,234.5 | 5,756.0 | 7,401.5 | -374.1 |
| Socialist: | | | | | | | | | |
| Export (rubles) | 26,903.0 | 31,191.5 | 34,136.2 | 37,714.0 | 42,109.6 | 44,467.3 | 45,656.9 | 44,199.0 | 21,454.3 |
| Import (rubles) | 23,649.5 | 26,742.4 | 30,815.8 | 33,695.7 | 38,260.8 | 42,491.9 | 41,839.6 | 42,121.2 | 22,102.4 |
| Trade balance..... | 3,253.5 | 4,449.1 | 3,320.4 | 4,018.3 | 3,848.8 | 1,975.4 | 3,817.3 | 2,077.8 | -648.1 |
| CMEA: | | | | | | | | | |
| Export (rubles) | 24,339.0 | 28,566.4 | 31,149.9 | 34,449.3 | 38,167.3 | 40,223.8 | 42,188.7 | 40,695.3 | 19,598.0 |
| Import (rubles) | 21,437.7 | 23,618.9 | 27,552.4 | 30,811.5 | 34,621.5 | 37,884.2 | 37,796.0 | 38,856.0 | 20,336.3 |
| Trade balance..... | 2,901.3 | 4,947.5 | 3,597.5 | 3,637.8 | 3,545.8 | 2,339.6 | 4,392.7 | 1,839.3 | -738.3 |
| Non-CMEA: | | | | | | | | | |
| Export (rubles) | 2,564.0 | 2,625.1 | 2,986.3 | 3,264.7 | 3,942.3 | 4,243.5 | 3,468.2 | 3,503.7 | 1,856.3 |
| Import (rubles) | 2,211.8 | 3,123.5 | 3,263.4 | 2,884.2 | 3,639.3 | 4,607.7 | 4,043.6 | 3,265.2 | 1,766.1 |
| Trade balance..... | 352.2 | -498.4 | -277.1 | 380.5 | 303.0 | -364.2 | -575.4 | 238.5 | 90.2 |
| Non-Socialist: | | | | | | | | | |
| Export (dollars) | 34,984.0 | 36,002.5 | 39,932.2 | 40,564.3 | 39,507.9 | 33,995.5 | 32,351.4 | 37,949.3 | 19,322.4 |
| Import (dollars) | 32,051.8 | 36,051.7 | 35,288.3 | 34,979.9 | 33,241.6 | 32,178.3 | 29,402.3 | 29,440.8 | 18,863.1 |
| Trade balance..... | 2,932.3 | -49.1 | 4,643.9 | 5,584.5 | 6,266.1 | 1,817.3 | 2,949.1 | 8,508.4 | 459.2 |
| Developed West: | | | | | | | | | |
| Export (dollars) | 24,418.6 | 23,943.8 | 25,940.3 | 26,404.6 | 26,166.7 | 22,398.5 | 18,691.3 | 22,468.3 | 11,649.0 |
| Import (dollars) | 24,207.7 | 25,278.9 | 26,053.6 | 25,298.9 | 23,998.8 | 23,039.3 | 22,466.1 | 21,927.8 | 14,711.0 |
| Trade balance..... | 210.9 | -1,335.0 | 113.3 | 1,105.6 | 2,167.8 | -640.9 | -3,774.7 | 540.4 | -3,062.0 |

| | | | | | | | | | |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|---------|
| Developing countries: | | | | | | | | | |
| Export (dollars) | 10,565.6 | 12,058.7 | 13,991.7 | 14,159.8 | 13,341.1 | 11,597.2 | 13,660.0 | 15,481.0 | 7,673.3 |
| Import (dollars) | 7,844.2 | 10,772.7 | 9,234.8 | 9,680.9 | 9,242.8 | 9,139.0 | 6,936.0 | 7,513.1 | 4,152.2 |
| Trade balance..... | 2,721.5 | 1,286.0 | 4,756.9 | 4,478.9 | 4,098.4 | 2,458.1 | 6,723.9 | 7,968.1 | 3,521.1 |

¹ First half of 1988.

Source: Calculated from data in PlanEcon Report, vol. III, Nos. 39-40 (Oct. 1, 1987), and vol. IV, Nos. 39-40 (Oct. 14, 1988).

Increased merchandise trade with the West was slow to expand despite implementation of the policy of interdependence with leading Western countries. Soviet trade flows with Japan, the Federal Republic of Germany and the United States show either small increases or actual reductions, as Soviet hard currency imports were cut while exports of oil and gold rose. To a large extent, the expansion of Soviet commerce with the West was restrained by balance of payments concerns. Just as the General Secretary launched his policy of interdependence in 1985-86, the price of oil fell dramatically and the exchange rate of the dollar plummeted. With approximately 80 percent of its hard currency exports in energy, the U.S.S.R. in 1985-86 suffered a decline in its current account balance. At the same time, good grain harvests in these years allowed for reduced imports of wheat, corn, and soybeans to help offset lost export earnings. Due especially to continuing losses in delivery of food from the field to table and the signing of the new Long Term U.S.-U.S.S.R. grain agreement, agricultural imports may rise again.⁵

External factors, particularly the price change for oil, had an impact on Soviet trade with CMEA countries as well. As the oil price dropped (this affected Eastern Europe on a delayed basis, given the CMEA mechanism for pricing Soviet energy exports based on the previous 5 years' average), Soviet terms of trade with Eastern Europe deteriorated, with export prices falling nearly 4 percent in 1987 while import prices rose only 1 percent. Although Soviet policy statements had for several years indicated interest in reducing the Soviet trade surplus with Eastern Europe, the shift in the terms of trade caused by world price changes provided the real momentum for a reversal in trade flows. Thus, in 1987, the Soviet surplus with CMEA countries fell to 1.8 billion rubles, from 4.4 billion rubles in 1986, and was expected to become a deficit in 1988.⁶

Judging by results, Gorbachev's policy on economic relations with Eastern Europe and the relationship of Soviet *perestroika* to East European economic policies remains unclear. On the one hand, the Soviets may find it reasonable in commercial practice to squeeze the East Europeans for more quality exports, notably machinery and food, to support Soviet economic needs; on the other hand, slow growing East European economies may be unable to afford this additional burden without risking political instability. The equivocal result for East European domestic policies is illustrated by strong Soviet policy statements in support of *perestroika* throughout the region, without concrete changes in trade and resource flows that would indicate the reduced requirements on Eastern Europe needed to facilitate successful change.

⁵ For further analysis of trade trends, see *Vneshnyaya Torgovlya*, No. 3, 1988, *PlanEcon Report*, vol. IV, No. 14 (Apr. 8, 1988); and Economic Commission for Europe (ECE), *Economic Survey of Europe in 1987-1988*. See U.S. Congress, House, Committee on Banking, Hearings on "Bank Lending to Warsaw Pact Nations," Sept. 22, 1988, especially data presented by the Department of Treasury and testimony of Donald Green, Richard Neu, and Roger Robinson. See also Edward C. Cook, "U.S.S.R.: The Mystery of the Missing Meat" U.S. Department of Agriculture, *CPE Agricultural Report*, vol. 1, No. 5, September/October 1988, pp. 1-3; John P. Hardt, "U.S.-Soviet Economic and Technological Interaction," in Andrew J. Goodpastor, Walter J. Stoessel, Jr., and Robert Kennedy, eds. *U.S. Policy Toward the Soviet Union*, (Lanham, Md.: University Press of America, 1988).

⁶ *PlanEcon Report*, vol. IV, No. 14 (Apr. 8, 1988), p. 1.

In relations with the developing countries, Soviet policy has been directed toward promoting Soviet commercial interests with less reliance on credit and aid. In the non-CMEA socialist world—for example, Cuba, Vietnam, Ethiopia, and Angola—this policy would suggest that the “burden of empire” is to be reduced. Notably, the U.S.S.R. has used increased arms sales to developing countries as a means of offsetting its lost earnings from oil. Iraq has been the largest purchaser, as the Soviet Union delivered nearly \$11.5 billion in arms to Iraq in the period from 1984–87.⁷ Commercial relations with developing countries with comparative advantages and soft currency, such as India, have expanded.

As these performance data suggest, the U.S.S.R. is experiencing constraints in expanding its foreign economic activity; its reaction has been to find short-term solutions to overcome immediate problems and meet critical needs. However, if its stated policy of interdependence were more actively pursued in practice, there would be a variety of measures that might be taken to deal with these obstacles in the international environment and in the Soviet domestic economy. As defined by Ivan Ivanov, Soviet policy is to utilize “all modern arrangements used in international business,” which include—

industrial and technological cooperation, joint manufacturing (in the U.S.S.R. and abroad), economic and technical assistance, leasing, engineering, consulting, contractual R&D, franchising, subcontracting, credit, monetary, investment, securities, and insurance operations, as well as trading commodity exchanges.⁸

While some initiatives have been taken in decentralizing the foreign trade mechanism, authorizing joint ventures, and becoming more involved in international economic activity, more far-reaching changes might be looked for in the longer term if Soviet interdependence is to become a reality. Of course, successful domestic economic reform and restructuring will be a necessary ingredient for developing a more vital role in the international economy, to the extent that it makes possible the production of a high-quality, competitive goods and the implementation of a more flexible economic mechanism. However, if the Soviet Union continues to follow a conservative approach to foreign borrowing and hard currency imports, new instruments of Western commerce will not lead to major commercial expansion.⁹

Given the tightening of Soviet hard currency earnings in the wake of the oil price decline, the importance of credit in Soviet commercial activity has grown. (See Table 2.) Despite some expansion of debt undertaken by the U.S.S.R. in 1985–86, the country continued to rely primarily on increased sales of energy, gold, and arms to meet its import needs. Increased use of credit and other mechanisms of international finance is likely to be sought if the needs of *perestroika*—both consumer goods to win the support of Soviet citizens, and producer goods to raise the level and quality of Soviet manufacturers—are to be satisfied. One of the more radical

⁷ Richard F. Grimmett, *Trends in Conventional Arms Transfers to the Third World by Major Supplier, 1980–1987*, Congressional Research Service Report for Congress, May 9, 1988, p. 5.

⁸ Ivanov, “Restructuring,” p. 216.

⁹ Wharton Econometric Forecasting Associates (WEFA), *CPE Outlook for Foreign Trade and Finance*, July 1988.

leading Soviet economists, Nikolai Shmelyev, has in fact called for a substantial growth in foreign debt:

In world practice the growth of foreign debt, as long as it does not exceed certain limits, is regarded as an absolutely normal phenomenon. Moreover, this growth in debt is, for many countries, characteristic, as a rule, precisely during those historical periods in which a profound structural reform of their economy is taking place.

We could clearly borrow several tens of billions of dollars on the world credit markets in the next few years, while remaining solvent, that is, without crossing the danger point.¹⁰

TABLE 2.—U.S.S.R.: ESTIMATED HARD CURRENCY BALANCE OF PAYMENTS

| | [In millions of dollars] | | | | | | | | | |
|---|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------------------|
| | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 ¹ |
| Current account | | | | | | | | | | |
| balance..... | -4,565 | 1,470 | -387 | 4,293 | 4,760 | 4,664 | 137 | 1,376 | 5,073 | 1,400 |
| Merchandise trade | | | | | | | | | | |
| balance..... | -4,804 | 1,814 | 365 | 4,468 | 4,712 | 4,727 | 519 | 2,013 | 6,164 | 2,700 |
| Exports, f.o.b..... | 9,453 | 27,874 | 28,254 | 31,975 | 32,429 | 32,173 | 26,400 | 25,111 | 29,092 | 30,000 |
| Imports, f.o.b..... | 14,257 | 26,060 | 27,889 | 27,507 | 27,717 | 27,446 | 25,881 | 23,098 | 22,928 | 27,300 |
| Net interest | -521 | -1,234 | -1,752 | -1,275 | -1,052 | -1,163 | -1,482 | -1,737 | -2,191 | -2,400 |
| Other invisibles and transfers..... | 760 | 890 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 |
| Capital account | | | | | | | | | | |
| balance..... | 6,981 | 284 | 5,430 | -2,965 | -1,541 | -124 | 1,869 | 1,966 | -1,017 | 1,710 |
| Change in gross debt—..... | 6,786 | -792 | 1,977 | -640 | 116 | 224 | 6,804 | 6,983 | 4,768 | 860 |
| Official debt..... | 1,492 | -280 | -1,370 | 967 | 340 | -375 | 463 | 563 | 561 | 190 |
| Commercial debt..... | 5,294 | -512 | 3,347 | -1,607 | -224 | 599 | 6,340 | 6,420 | 4,207 | 670 |
| Net change in assets held in Western banks ² | -163 | -35 | -166 | 2,122 | 277 | -664 | 1,787 | 1,595 | -527 | 20 |
| Estimated exchange rate effect..... | -22 | -411 | -1,457 | -817 | -1,070 | -688 | 3,248 | 3,322 | 5,012 | -2,570 |
| Net credits to LDC's..... | 715 | 950 | 870 | 2,120 | 3,200 | 2,700 | 1,700 | 4,100 | 4,800 | 5,500 |
| Gold sales..... | 725 | 1,580 | 2,700 | 1,100 | 750 | 1,000 | 1,800 | 4,000 | 3,500 | 3,800 |
| Net errors and omissions ⁴ | -2,416 | -1,754 | -5,043 | -1,328 | -3,219 | -4,540 | -2,006 | -3,342 | -4,057 | -3,110 |

¹ Preliminary.

² Including additions to short-term debt.

³ A minus sign signifies a decline in the value of assets.

⁴ Includes hard currency assistance to and trade with Communist countries, credits to developed Western countries to finance sales of oil, other unspecified hard currency expenditures, as well as errors and omissions in other line items of the accounts.

Source: CIA and DIA, "The Soviet Economy in 1988: Gorbachev changes course," presented to joint economic committee, Apr. 14, 1989.

The authorization of joint ventures may be seen as one means of coping with the hard currency constraint and improving the quality, competitiveness, and diversity of Soviet manufactures. The new Soviet law (as revised) allows for foreign ownership up to 99 percent, joint foreign-Soviet management (chairman and director general of the enterprise may be foreign), foreign repatriation of prof-

¹⁰ Nikolai Shmelyev, "Novy trevogy [New Anxieties]," *Novy Mir*, No. 4 (April 1988), p. 170. See U.S. Congress, House, Committee on Banking, Hearings on *Bank Lending to Warsaw Pact Nations*, Sept. 22, 1988, especially data presented by the Department of Treasury and testimony of Donald Green, Richard Neu, and Roger Robinson.

its, and independence from the constraints of the Soviet Government's economic plan.¹¹

In the Soviet case, ad hoc joint venture agreements, even if arranged through consortia with especially favorable conditions, are not likely to create a trading relationship conducive to significant Soviet benefits and U.S. profits. To make such a relationship possible, qualitative changes on the Soviet side might include:

- A *key import strategy* that reflects current priorities of food processing, medical supplies and equipment, and housing, with a long-term focus on imports that improve efficiency in material output (e.g. the energy chain) and provide entry into the world machinery market (e.g. automobiles).
- The establishment of foreign commerce enclaves*, that is, sectoral or special regional zones, to foster the rapid development of new export-import culture.
- A *flexible balance of payments policy*, one that emulates successful Western experience.

Gorbachev seems to recognize as well that participation in the international economic institutions will be important as they play a major role in creating the framework for competition in the international market. Although the Soviet Union was originally invited to participate in the development of international economic institutions at the end of World War II, Stalin rejected these offers, maintaining instead a path of autarchic development. The Soviets now argue that ongoing reforms of the foreign trade sector, including plans to introduce customs duties and to move toward currency convertibility, will make them eligible for membership under the General Agreement on Tariffs and Trade (GATT). Observer status may be considered if reasonable full data disclosure or transparency in commercial transactions were forthcoming. They have also moved to establish informal relations with the International Monetary Fund and have requested a United Nations Committee to make a study of non-market economies membership in international economic organizations. In addition, the U.S.S.R. has led efforts to establish official links between the CMEA and the European Community (EC), presumably as another means of improving conditions for expanded trade.¹²

IV. IMPLICATIONS FOR EASTERN EUROPE

Although a general model of perestroika and interdependence may develop, it has yet to take shape. While East European reforms gain from the policy support provided by Soviet perestroika

¹¹ Decree of the Presidium of Supreme Soviet, Jan. 13, 1987, "On Questions Concerning the Establishment in the Territory of the U.S.S.R. and Operation of Joint Ventures, International Amalgamations and Organizations with the Participation of Soviet and Foreign Organizations," *Vedemosti Verkhovnogo Soveta SSSR*, 1987, No. 2, Art. 35; Decision of the Central Committee of the Communist Party of the Soviet Union and the U.S.S.R. Council of Ministers, "Additional Measures to Improve the Country's External Economic Activity in the New Conditions of Economic Management," *Ekonomicheskaya Gazeta*, No. 41 (October 1987). See also *Current History*, *op cit*.

¹² For further discussion of Soviet participation in international economic organizations, see Anders Aslund, "The New Soviet Policy Towards International Economic Organizations," *The World Today*, February 1988; Jozef M. van Brabant, "The GATT and the Soviet Union—A Plea for Reform," *United Nations, Department of International Economic and Social Affairs, Working Paper No. 6*, August 1987, also see van Brabant, "Planned Economies in the GATT Framework," *Soviet Economy*, January-March 1988, pp. 3-35.

and interdependence, the implementation of Soviet programs may add a net burden to Eastern Europe. This dual impact of Soviet policies is illustrated below.

REFORM

On the one hand, perestroika in the Soviet Union would support East European reformers' plans to remove excessive personnel in the central bureaucracy, limit party intervention in the economy, move toward market pricing, decentralize management, and innovate at the enterprise level by introducing new mechanisms and measures such as cooperatives and leasing. On the other hand, the additional resources needed for reform are not supplied by Soviet trade policies, loans, or credits more favorable to East Europe. Soviet support for East European reform may thus be more rhetorical than tied to concrete actions that improve resource availability.¹³

RESTRUCTURING

Although Soviet perestroika supports a shift from old to newer, more modern enterprises (extensive to intensive development), the burdens on East Europe from Warsaw Pact military agreements and pressures to contribute to global aid continue, and may not be decreased. Moreover, continuing Soviet imports of traditional products such as coal and steel may tend to sustain older industries and slow the closing of inefficient mines and factories in the East European countries. Increased demand for East European hard goods to support Soviet domestic modernization may also compete with these countries' domestic needs, and simultaneously restrict East European capabilities for exporting to the West.

The inefficient use of material, human and capital resources and poor quality of output—below world market levels—are problems shared with the Soviet Union, although in varying degrees, by each East European economy. The East Europeans, however, have less economic maneuvering room than the Soviets for shifting resources into investment to modernize industry, infrastructure, and agriculture. Moreover, the “guns” or “modernization” choice is largely controlled by Soviet leaders' decisions, not by East European leaders themselves. A concrete contribution by the Soviet Union to stimulate East European modernization would be a reduction of the Warsaw Pact burden on the countries of the CMEA.

RENEWAL

East European liberals may benefit from democratization and openness (*glasnost*); and the invitation to open old historical wounds (blank spots) might serve to ease hostility toward the Soviet Union.¹⁴ However, some restraint might be shown by the

¹³ Ivan Berends, President of the Hungarian Academy of Sciences, at the Hungarian Party Congress called publicly for a reduction of the Warsaw Pact resource burden as a means to facilitate the effectiveness of Hungarian reform under its new leadership.

¹⁴ Yuri Afanasiev, Rector of the Soviet Historical Archives, called for opening of Soviet archives to air issues such as Katyn Forest, the Warsaw Uprising, the Prague Spring and the Nazi-Soviet Pact, in a talk at the Library of Congress, Oct. 5, 1988. See also interview with Afanasiev in Milan, *Europeo*, Aug. 27, 1988, in FBIS, *Soviet Union, Daily Report*, September 1988.

Soviet Union in pressing its new initiatives on the East European countries, due to concern that the Leninist framework would not limit change in East Europe and political stability might not be sustainable as old leaders are replaced or deposed by new, less predictable leaders.

INTERDEPENDENCE

Soviet perestroika, in part, may encourage greater interdependence for Eastern Europe in the world economy. In particular, these countries may adopt the Western-oriented strategy with priority on modernization; develop stronger bilateral ties outside the CMEA—possibly improving inter-German, Austrian-Hungarian, or even Hungarian-South Korean and Israeli relations; not only join but accept conditionality for obtaining benefits, resources and discipline from the IMF and the World Bank. However, in this process, the Soviet Union may leave the East European countries on their own to be responsible for their economic and institutional commitments of interdependence, without a credit “umbrella” or assistance in facilitating political and economic relations with other nations.

Thus, while the Soviet Union appears to support East European *perestroika* and interdependence in principle, and seems willing to provide increased “maneuver room” for East European allies to seek their own routes of development, the U.S.S.R. does not appear willing to underwrite East European change, to reduce Soviet claims on East European resources or to diminish the burdens of alliance policies determined in Moscow. East Europe may thus use its greater maneuver room to look to closer economic ties with the West.

TOWARD A RENEWAL OF SOCIALIST ECONOMIC INTEGRATION (SEI)?

By Jozef M. van Brabant*

The decision of the 44th Council Session (Prague, 5-7 July 1988) of the CMEA from now on to strive resolutely for the establishment of a unified or common market, if adhered to, signals a seminal shift in the purposes and goals of SEI. This declaration of intent is only the latest addition to calls for revamping the "mutual assistance" organization, but incipient progress toward reform appears to be crystallizing. Do these developments signal new horizons for the CMEA?

The recent agitation for reform can usefully be projected against the sequence of unsettling economic developments thus far this decade. These include most notably: poor to mediocre economic performances, severe external payments constraints, uncertain outlook for resuming more buoyant economic growth, failure to conceive and implement target programming as a positive strategy to tackle in a coherent fashion the region's adjustment requirements, and the overarching sociopolitical and economic malaise in the CMEA since the late 1970's. This state of affairs owes a good deal to, but is in part also responsible for, the overwhelmingly defensive nature of the national economic policies pursued during the early 1980's to come to grips with unforeseen CMEA developments, the failure to implement the Target Programs that had been slated as the strategy of the 1980's and beyond,¹ and the partly fortuitous global shifts in finance, trade, and relative prices.² Although target programming failed, its original intention to come to grips with issues of structural policy has lingered in CMEA debates, particularly in view of the recent sluggish economic performance of the CPE's individually and as a group, inability to counter quickly the external emergency adjustment measures, lack of CMEA cohesion and support, and the hesitant groping for broad-based economic reform centered on indirect economic coordination.

To reassert legitimacy the political leadership is under pressure to surmount the slow growth of the early 1980's and to resume predictable, steady gains in per capita incomes. There is by now con-

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¹ Admittedly, some programs concerned mainly with fuels, energy, and raw materials were adhered to, albeit at a greatly reduced pace. But target programming never jelled into an operational approach to comprehensive SEI as suggested in Bagudin, Pavel D., Evgeniy O. Gavrilov, and Nikolay N. Shinkov, *Sotrudnichestvo stran-chlenov SEV v oblasti planovoy deyatelnosti* (Moscow: SEV Sekretariat, 1985).

² For a review, see my *Adjustment, Structural Change, and Economic Efficiency—Aspects of Monetary Cooperation in Eastern Europe* (New York, NY: Cambridge University Press, 1987), pp. 88-105; and "Economic Adjustment and the Future of Socialist Economic Integration," *Eastern European Politics and Society*, 1 (1987:1), pp. 76-84.

sensus that this can be attained only through a significant injection of foreign stimulus. Because of the inauspicious environment for appreciable capital inflows from abroad and lingering external payment constraints, this impetus will in the first place have to be built up through SEI, at least until the CPE's succeed in restoring domestic and external balances at a level and structure of economic activity that enhance their competitiveness in global markets.

The recent emphasis on improving economic efficiency in part through reforms has been generating ripples throughout the CMEA, including the organization itself. The latter had remained rather passive and immune to the successive Eastern European economic crises and the collective development and integration policies enshrined in official documents. This exceedingly conservative behavior manifested itself in spite of the agitation for substantive changes that eventually led up to the June 1984 and November 1986 economic summits, the rapid succession of meetings of the Central Committee Secretaries in charge of economic affairs (CCS for short),³ and the Council Sessions convened since mid-1984.⁴ It is by now widely accepted that the policies, institutions, and instruments in place in the CMEA are not well suited to buttress, let alone to enhance, the ongoing shifts in economic policies and mechanisms in some CPE's.

At the latest since the preparations for the first economic summit of the 1980's went beyond the declamatory phase, which eventually led to the June 1984 summit, there has been considerable agitation for reversing the passivity of the CMEA as a regional economic institution and enacting profound changes in SEI. These can be grouped under three main headings. First, a broad-based debate has erupted primarily around revamping the institutional set-up of the CMEA with a view to rationalizing the bureaucracy, streamlining the mechanisms through which issues get tabled, and rendering the deliberative organs more effective. Second, the ultimate purposes of SEI and means (institutions, instruments, policy coordination, and structural macroeconomic policies) to pursue it were to be reexamined rather comprehensively. Finally, the institutions and instruments to enhance day-to-day matters affecting SEI—the SEI mechanism in the strict sense—were to be refocused including in support of emerging reforms.

These three bundles of problem areas have been at the center of numerous investigations conducted at various hierarchical levels and from a number of different angles. They have been the preoccupation of debates in the highest policymaking organs, including the two summits, most Council Sessions held since 1983, and the numerous meetings of the CCS. Though a consensus is at best only slowly emerging, some important decisions have been taken; a few have already been implemented or are in the process of being car-

³ This has incidentally emerged as a truly new, if unofficial, apex organ of the CMEA. It essentially came into its own in late 1982 and 1983 in connection with the tortuous preparations of the June 1984 summit. Since then, it has played a critical role in propagating new thinking and translating it into blueprints tabled for the Summit and Council Session.

⁴ For details, see my "The CMEA Summit and Socialist Economic Integration—A Perspective," *Jahrbuch der Wirtschaft Osteuropas—Yearbook of East-European Economics*, Vol. 12/1 (1987), pp. 129–160.

ried out. There are, however, many critical issues that continue to form part and parcel of the ongoing policy agenda for deliberation.

Disclosures about some of the intramural discussions have become perceptibly more interesting roughly since mid-1987 and the important 43d CMEA Session (Moscow, 13-14 October 1987). The latter revealed *ex post* the seminal contribution of the November 1986 summit, which had earlier been written off as a failure, to polarizing the movement toward reorganization and SEI reform. It confirmed that vigorous exchanges on the reorganization of the CMEA and the prospective policies and instruments of SEI had been underway at least since the latest CMEA policy blueprint—on scientific-technological cooperation (STC) as endorsed at the 41st Council Session in December 1985—got sidetracked. Five groups of issues can be distinguished.

First, in Moscow the members agreed, apparently unanimously, to streamline the CMEA organization. This involves abolishing organs that have not performed well over the years, consolidating units that have in effect duplicated one another, retrenchment of the civil service, and generally gearing preoccupations entrusted to the CMEA less to the day-to-day planning of resource allocation than to the charting of the medium- to long-term strategic directions for structural change. All these objectives are in fact quite similar to the intentions of *perestroika*, with the Soviet version providing the major impetus for change.

Some organizational modifications were carried out in early 1988. Ikonnikov⁵ reports that of the 36 official organs in place in October 1987, 19 were abolished, merged, or replaced; and 6 new ones were set up, so that by early 1988 only 24 official organs survived.⁶ In this total are included changes in Committees, Standing Commissions, and Conferences. Three new Committees of the Executive Committee were created and one (on material-technical supply) was abolished, so that six such organs existed in early 1988. The number of Standing Commissions was severely curtailed. Of the 23 extant at the end of 1987, 12 were kept; 2 were merged; and a further 2 were newly created, so that there are now 15.⁷ Finally, one of the Conferences (legal affairs) was transformed into a Standing Commission and five others were abolished altogether, leaving only the Conference of Water Administration and Shipping. The Institutes have apparently not been touched. Moreover, about one-third (roughly 600 to 700 individuals) of the civil service, primarily among the Secretariat and Research Institute staff, was slated to be cut. But I have no evidence regarding the implementation of this decision in early 1988.⁸ There evidently remains considerable

⁵ Ikonnikov, Igor', "Sovershenstvovaniye struktury SEV," *Ekonomicheskoye sotrudnichestvo stran-chlenov SEV*, 14 (1988:2), pp. 20-21.

⁶ Note that by my tally the official organs (Session, Secretariat, Executive Committee, and four Committees, 23 Standing Commissions, seven Conferences, and three Institutes) numbered 40 before the reorganization and 28 thereafter. I can square these data with Ikonnikov's only by leaving out the Session and the Institutes as being perhaps organs that he did not consider to be among the *predstavitel'nye organy*. But that is at best arbitrary.

⁷ Ikonnikov, Igor', *op. cit.*, p. 21, reports that the Standing Commission for Cooperation With Developing Countries was abolished too. However, I have never heard of it and there is no previous record of it in official documents.

⁸ The reduction of the staffing table of the Secretariat was reported in Prague to be 31.7 percent of the mandated contingent of late 1987 (*Hospodárské Noviny*, 1988:23, p. 11).

room for further retrenchment and coaxing the CMEA civil service into greater efficiency.⁹

These changes are part and parcel of a much more sweeping reform of the CMEA organization and personnel, including the specialized or affiliated CMEA organs. The 44th Council Session welcomed the changes enacted, called for further vigorous restructuring, and mandated additional changes to orient the activity of the CMEA and its associated organs "toward seeking, substantiating, and determining strategic and conceptual solutions for scientific-technical problems."¹⁰ Pending further simplification of the CMEA structure, it was decided in Prague to fuse the Standing Commission for ferrous with that for nonferrous metallurgy, and for civil aviation with that of transportation;¹¹ the Standing Commissions for oil and gas, coal, and geology would be merged into a new Committee attached to the Executive Committee;¹² and a great number of specialized organizations would be abolished, but details are lacking.¹³

Second, there was widespread agreement in Moscow—although the assent in some cases was rather reluctant—to rechart assistance policies to Cuba, Mongolia, and Vietnam. Past economic and technical development assistance efforts rendered to these countries were deemed to have been less effective than desirable for donors as well as recipients. The former agreed to elaborate a dovetailed multilateral approach and to enshrine it in a medium- to long-term coherent assistance program with a view to improve measurably the benefits accruing from these efforts.

Three separate drafts of comprehensive economic cooperation with each of the non-European members were presented in Prague. Once harmonized into a coherent stance on technical and economic assistance, it will become part and parcel of the new SEI strategy. (See below.) The basic objective is to integrate these countries more fully into the CMEA edifice, including through concrete agreements on production cooperation and specialization, STC on more than a gratuitous basis, and further commercialization of their economic interactions with the CMEA. Some forms of assistance to the non-European countries will continue to be provided by the developed membership on a gratuitous basis, however. The programs also contain relatively extensive lists of specific projects to be commissioned.¹⁴ But the donor countries have already made it clear that a number of those projects "require clarification as regards construction deadlines, assessments of the economic expediency of individual projects, and measures to ensure that they produce returns as soon as possible."¹⁵ Further details are lacking, however.

⁹ See Shiryayev, Yuriy S., "SEV: sovremennaya strategiya ekonomicheskogo i nauchno-tekhnicheskogo sotrudnichestva," *Izvestiya akademii nauk—seriya ekonomicheskaya*, 19, (1988:1), 3-17.

¹⁰ Speech by Lubomir Strougal as reported in *Rudé Právo*, 6 July 1988, p. 4.

¹¹ *Hospodářské Noviny*, 1988:23, p. 11. Note that this measure was reported "realized" in early 1988 (Ikonnikov, Igor', *op. cit.*, p. 21).

¹² Speech by Constantin Dăscălescu as reported in *Scinteia*, 8 July 1988, p. 5.

¹³ Carlos Rafael Rodriguez (*Rudé Právo*, 6 July 1988, p. 2) mentioned "the reduction of the number of permanent bodies from 107 to 34, the establishment of new committees, and the merging of activities [that] will result in greater flexibility in the CMEA mechanism." But the precise context is unclear.

¹⁴ Georgi Atanasov reported that Bulgaria would be prepared to participate in "71 of the total of 178 actions envisaged in the specific comprehensive programs" (*Rabotnicheskio delo*, 6 July 1988, p. 6).

¹⁵ From Ryzhkov's speech as reported in *Prauda*, 6 July 1988, p. 4.

Third, it was agreed virtually unanimously to work out a new SEI strategy for the period 1991–2005 anchored to a new concept of the international socialist division of labor (ISDL). Efforts to move beyond previous plans and programs on SEI by taking a fresh look at the objectives, policies, instruments, and basic institutional supports of regional cooperation have been on the debating table since the earliest calls for holding a top-level CMEA economic summit earlier in the decade. This program, tentatively entitled *Collective Concept of the ISDL for the Years 1991–2005*, was slated to be presented in an advanced draft form to the Prague CMEA Council Session. Its major objective would be laying the foundations for a unified market and thus ensuring the “transition to a qualitatively new level of cooperation” in the years ahead. In addition to reiterating well-tested forms of SEI and strengthening planning in medium- to long-term development, the new program should foster economic efficiency and the role of economics in commodity and financial relations of all economic organizations involved in SEI by putting in place proper instruments.

A draft was debated in Prague, although the 1–2 June 1988 CCS meeting in Budapest had strenuously objected to its excessive blandness and generality. But it has not yet been published. The Secretary of the CMEA clarified that the new concept focuses on accelerating technological progress, intensifying production, broadening production specialization, and integrating more fully the non-European CMEA members. It also singles out the main branches, chiefly engineering and electronics, and pays attention to the use of raw materials, social issues, and cooperation in environmental protection.¹⁶

The idea to create a unified CMEA market was first muted by Ryzhkov in Moscow. At the Prague meeting, it was endorsed by all, except Rumania, and placed at the core of the new ISDL concept. Its adoption on the eve of the 40th anniversary of the CMEA may be symbolically significant. But the communiqué is very carefully worded and masks some of the more impassioned presentations, including by Ryzhkov.¹⁷ He noted that this market aims at—

ensuring a high degree of uniformity of economic conditions, the relatively free movement of goods, services, manpower, and finances among our countries' economic organizations, and the unified macroeconomic regulation of economic processes—regulation based on a coordinated policy—are a matter for the remote future. But we must keep this prospect in mind even now. For us the unified market is not a fashionable slogan but an important guideline for the development of the integration process.

Directly related to the program, fourth, are major decisions revolving around the precise mechanism of SEI to be elaborated in conjunction with, and perhaps in support of, the ongoing reform process in key CPE's. Gaining concurrence on this matter has been very much convoluted. Although there was broad agreement in Moscow on the need to revisit key elements of planning and monetary-financial cooperation, members were divided on a number of critical economic issues, including the introduction of a modified form of limited regional convertibility, multilateralism in trade

¹⁶ Interview with Mr. Vyacheslav V. Sychev as reported in *Rudé Právo*, July 8, 1988, p. 2.

¹⁷ The communiqué is in *Izvestiya*, 8 July 1988, pp. 1 and 4. Ryzhkov's speech is reported in *Pravda*, 6 July 1988, p. 4.

and payments, the determination of unified exchange rates, the revision of the price-formation mechanism, the linking of domestic and trade prices, and the role of capital movements within the CMEA. The Session also emphasized the need to reinvigorate the implementation of the program on STC by measurably improving the economics of interfirm relations as well as the organizational prerequisites to foster such relations with a view to enhancing SEI. It was stressed in particular that there is a need to invest such relations with economic guidance rules and institutional supports to facilitate microeconomic decisionmaking. The measures envisaged include settlement of accounts for selected transactions, implying in fact some highly limited¹⁸ form of intraregional convertibility, though that is a misnomer as convertibility is not really at stake. In addition, it was envisaged to improve domestic and trade pricing, exchange rates, the credit mechanism of the International Investment Bank, trade and payments multilateralism through the International Bank for Economic Cooperation, and other aspects of the economic mechanism.

The links of the reformed mechanism to the aforementioned new integration program as well as specifications on both should have been the particular focus of the 44th Council Session. The Prague Session emphasized the need to have a mechanism in support of more intensive forms of economic development and integration. For that, the role of the economic tools of management must be improved, the function of cooperation through the coordination of national economic plans must be modified, and firms are now to play a much more significant role in the day-to-day pursuit of SEI. A particularly critical role in enhancing interfirm relations based on economic incentives falls onto the transferable ruble and CMEA trade prices. These and other elements of the refurbished economic mechanism of SEI are to be firmly in place in time for the introduction of the next medium-term plans in 1991. An unusual item on the agenda was the creation of socialist multinationals centered around key national firms. The U.S.S.R. declared that it was "prepared to study thoroughly [this idea] with those partners who are interested."¹⁹ The suggestion had earlier been endorsed at the June CCS meeting. But further details are lacking.

Finally, the 43d Council Session paid lipservice to the need to achieve better results with the habitual coordination of economic plans and indeed to provide supports at the regional level for interfirm relations. Once again, this is nothing new. Particularly the speeches on behalf of the GDR and Rumania at the 43d Session emphasized the paramount role of plan coordination to foster STC and to ensure prompt deliveries of adequate volumes of critical fuels

¹⁸ Limited in three respects: only preset regional (chiefly interfirm relations under the program on STC) transactions can gradually, starting in 1991, qualify over a period of at least 10 years. Agreement in principle was reached by seven members, with the GDR, Rumania, and Vietnam dissenting. Some progress has in the meantime been reported by Bulgaria, Czechoslovakia, Mongolia, and the Soviet Union. Some will commence such transactions immediately or in early 1989. They will be conducted in local currency with the volumes to be translated into transferable rubles at special exchange rates, and then reported to the regular trade accounts. For details in the case of Czechoslovakia and the Soviet Union, see Větrovský, Jiri and Vasil Hřinda, "Zúčtování přímých vztahův národních měnách CSSR a SSSR—rubl a koruna," *Hospodářské Noviny*, 1988:15, p. 3; for Czechoslovakia and Bulgaria, see *Svět Hospodářství*, 1988:88, p. 2.

¹⁹ Only Ryzhkov apparently raised it in Prague (*Prauda*, 6 July 1988, p. 4).

and raw materials, respectively. These policy stances contrast rather shrilly with the role accorded to these instruments by the commentators of the other CPE's. Enhancing the coordination of plans was also debated in Prague, but only on the margin by the GDR and Rumania. As Ryzhkov put it,²⁰ the new SEI mechanism should amount to—

a model of cooperation that, while preserving the forms that have proved valid, would be based on the criteria of efficiency, on the ever-increasing role of commodity-money relations and economic instruments, and on engaging the countries' economic organizations in all areas of cooperation on a broad scale.

A critical role is slated to be played by production specialization, particularly in engineering, but not only through planning at the intergovernmental level.

Against this backdrop, expectations regarding the followup Council Session in 1989—as they were for the 44th²¹—are very high, particularly since the CPE's will be commemorating the 40th anniversary of their organization. Not only must drafts on attitudes toward the developing country CPE's and the new concept of long-term SEI be further refined, the CPE's have also committed themselves to elaborating further a number of details on the new SEI mechanism (including prices, direct wholesale trade, exchange rates, convertibility, and regional settlements) and its institutions (including the two banks), and perhaps also on the further streamlining of the organizational structure of the CMEA as such.

By its very essence, integration means that relative scarcities between two or more countries will gradually be compressed as supply responses to a larger effective demand forms an integral component of the adjustment process entailed by a decision to seek genuine integration. Inasmuch as SEI has thus far been primarily geared to exchanging Soviet raw materials and fuels for manufactures from Eastern Europe proper, there should remain ample opportunities for the expansion of profitable commerce not only in manufactures from the Soviet Union but indeed also for competition of Eastern Europe countries with each other and in third markets.

Real SEI poses considerable adjustment problems and some Eastern European countries may be reluctant to engage in intragroup competition, if only because it may call for more adjustments in production and trade than they autonomously desire to protect. Thus the GDR may be called upon to share more of its existing technological edge than it is currently contemplating. But such externally induced change, however costly the transitional problems may be, will in and of itself not differ markedly, except in size and unregulated speed, from what these countries need to do to gain a more competitive edge in world markets. Export expansion, after all, is by now accepted as the preferred course.

If this "intensification" can be accomplished in an orderly, guided fashion within the CMEA framework, the adjustment burden may be less onerous than if these countries were to carve out a niche in global markets, and not only because of the competi-

²⁰ Speech reported in *Pravda*, 7 July 1988, p. 4.

²¹ Maciej K. Krzak ("Idziemy nierównym krokiem," *Życie Gospodarcze*, 1988:29, p. 5) referred to it as the "summit of the 10."

tion on the part of the NIC's. However the question of further integration in the CMEA or in global markets may be resolved, the future will be exciting although one should not harbor illusions that a change in SEI can be implemented quickly. At the policy-making level, it will be much more difficult to achieve consensus on the implementation of far-reaching reforms, given that a number of CPE's remain lukewarm at best toward reform at home, and hence in CMEA relations.

II. MEASURING AND INTERPRETING ECONOMIC PERFORMANCE

OVERVIEW

By John P. Hardt* and Sheila N. Heslin**

INTRODUCTION

Statistical measures, which form one component of information systems, conform to the values and priorities of the regime which designs and uses them. Often the collection, aggregation, and dissemination of information indicate the purposes for which it is used, the structure of the decisionmaking apparatus, and the extent to which society participates in decisionmaking. In the West, access to reliable information has long been considered a basic right and a precondition for an efficiently functioning market economy and democratic political process. East European information systems have lagged behind Western standards of accuracy and inclusiveness.

While particular East European nations, including Hungary, Poland, and Yugoslavia have taken steps to put the collection and aggregation of statistics on a level acceptable to international organizations such as the World Bank, the IMF, and the GATT, reform of statistical measures, in general, has been slow. Much of this may be attributed to the legacies of the Stalinist era when policymakers in the Soviet Union and Eastern Europe believed that tight control over the aggregation and dissemination of information provided a tool by which important decisions could be controlled and a nation's politico-economic development, as well as its "image" manipulated. In addition, a monopoly on information allowed an elite unrelated group of policymakers to defend even poor policies and enabled them to be held accountable only by themselves. Now, East European leaders embarking on reform have found that Stalinist-era information systems, with their inaccuracies and gaps in information carry increasingly high costs.

The papers in this section examine various aspects of East European information systems, outlining in detail the sources of statistical bias and potential for statistical reform (Fink and Havlik); trends in economic performance and human motivation (Thad Alton); trends in life expectancy and the social and environmental

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factors contributing to the development of such trends (Eberstadt); and population trends (Baldwin). Despite the absence of full and accurate statistical information, the authors have traced the deterioration of East European economic performance and demographic trends. Statistical reform, insofar as it is a tool which allows policymakers to better evaluate the state of the economy, identify the major problems, and engineer programs of change is, in many respects, a precondition for undertaking comprehensive reform—viewed by observers in Eastern Europe and the West, as necessary for East Europe's future stability and progress.

STATISTICAL MEASURES: BUILDING BLOCKS FOR EFFECTIVE DECISIONMAKING

Accurate and reliable statistical information is a basic component of effective decisionmaking. Specifically, policymakers may utilize statistics in domestic decisionmaking to frame, among others, a coherent industrial strategy based on internal rates of return and comparative advantage; cost effective social policies; and a security policy based, in part, on an acceptable mix of tradeoffs between guns and butter. Policymakers also apply statistical measures to decisionmaking concerning international economic issues: international lending rates, preferential tariff treatment, and even membership fees for international organizations are influenced by indigenous statistical measures such as inflation, debt/service ratio, and gross domestic output. In addition, successful East-West arms negotiations may depend, in part, on mutual agreement on how much is being allocated to defense, how large is the selective defense burden and how do the East Europeans make tradeoffs between guns and butter at the margin. The answers are based in part on accurate macro- and micro-economic statistical measures.

Although effective policymaking depends, in part, on the accuracy of statistical measures, distortions have long plagued Eastern Europe's economic, social, and military analyses. In the 1950's, East European policymakers applied the Stalinist politico-economic model which called for rigid central planning and development through extensive growth. Since, at that time, market forces were eschewed, upholding Western standards for accurate economic information was unnecessary. Another explanation offered for failure by East Europe's leaders to collect and disseminate accurate statistical information is that leadership benefits, including privileged access to information and dismissal of errors in judgment through the manipulation of data, outweighed the costs of inefficient resource allocation, rationing, widespread corruption and public cynicism.

In the 1960's, although many of the East European nations began to turn to limited market-orientation and economic interdependence with Western nations to stem declining economic growth and poor labor productivity, efforts to improve the efficiency of the economy were hindered by a lack of reliable economic information. Reforms, for the most part limited to minor adjustments of the existing model, were aimed at increasing individual incentives by de-

centralizing decisionmaking and relating rewards more directly to individual and enterprise efforts.

Without a parallel readjustment of the information system to provide reliable economic information quickly, even those reforms which were well conceived were susceptible to failure for several reasons. First, popular support for reform was considerably dampened by widespread skepticism regarding the need for reform in the face of statistics which continued to report rapid economic growth and increasing standards of living. Second, even after central planning was decentralized, managers continued to make decisions based on the advice of central planners because, in the absence of price reform and consistently reliable economic information, central planners de facto continued to control prices and resource allocation. In addition, middle managers seek information and advice from central planners in an effort to place responsibility for decisionmaking with the party and government officials, who ultimately decided which managers gained bonuses and which firms went bankrupt.¹

Statistical distortions, it may be argued, played an important role in the formulation of what are now broadly acknowledged to be the failed policies of the 1970's. Poor statistical information, on the one hand, compelled East European policymakers to make decisions without a clear idea of costs and benefits. At the same time, lack of accurate statistics allowed decisionmakers to justify the implementation of economically poor but politically "correct" policies which were designed to retain their outmoded economic system. Specifically, East European countries developed programs of rapid modernization and augmentation of standards of living based on import-led growth but pursued policies which ultimately undermined long-term growth. Prices, set administratively, distorted the long-term strategy for industrial restructuring and long-term modernization. Most investments were made with little consideration for the real rate of return, as undisciplined borrowing was spent on inefficient or unrealistic industrial investments. And agriculture, a sector in which many East European nations have a comparative advantage, was ignored. Indeed, these policies were continued even after the world oil price shocks of 1974 and 1979, without adjustment for global resource scarcities. The result was East European accumulation of hard currency debts without development of the necessary infrastructure to compete on world markets, repay debts, or maintain adequate levels of growth.

Inaccurate statistical information has, furthermore, been a pervasive—although underlying—cause of East-West tension, in both economic and military spheres. In general, lack of meaningful statistical information has led to distrust and skepticism by Western observers regarding the accuracy of East European trade and defense data. One result is evident in restrictive U.S. antidumping and trade law toward centrally planned economies. Specifically, U.S. policymakers have written trade laws based on the assumption that East European exports which are competitive in U.S. markets (both concerning price and quality considerations) may

¹ For a more detailed discussion, see Jan Vanous, *PlanEcon Report No. 12*, "Statistical Measures in the Soviet Union."

have been subsidized by their governments. U.S. policymakers assume that the absence of rational prices and exchange rates, combined with a "soft budget constraint" facing enterprises, make it possible for the East Europeans—to set prices below the U.S. market price, regardless of actual costs. Therefore, antidumping charges may be applied to any East European product if it can be proven that a "similar" firm in a roughly comparable market economy considered to be at a "similar" level of development cannot produce goods of the same quality at the same prices. East European producers have claimed that such laws essentially constitute nontariff barriers—raising the risks of trade with the United States to almost prohibitive levels. In fact, Eastern Europe has traditionally had closer trade relations with the West European nations partly because the latter have employed quantitative restrictions rather than antidumping laws.

Arms control negotiations have often stalled due to disagreements over existing force levels and a lack of information concerning East European military budgets. Conventional arms talks have been complicated by significantly worse Soviet statistical inaccuracies and gaps. In fact, the MBFR talks were blocked for years as data regarding the Warsaw Pact forces was simply not made available. General agreement concerning basic military and budgetary data and the joint sharing of this information are now recognized to be preconditions for progress in arms control negotiations.²

REQUIREMENTS FOR THE 1990'S

In the 1990's, credible statistical information may form an important cornerstone both in domestic reform and in the full range of East-West negotiation. In the economic sphere, the expected monetization of East European domestic economies and movement toward currency convertibility will render statistical reform both a possibility and an urgent necessity. Similarly, accurate statistical measures could facilitate East European assessment of newly implemented reform measures.

In this regard, there is an urgent need for several kinds of improvements. One is simply to make public all the statistical information that is considered essential in most countries. Another improvement needed is to reduce the (varying degrees of) statistical bias imparted to official statistics (e.g., on growth rates or on changes in the price level) by eliminating the personal or political "rewards" that are tied to such indicators of performance at the level of the enterprise, the ministry, and the highest authorities. Finally, new measures need to be devised which would capture important aspects of economic performance that are not measured by standard statistics. For example, growth rates, even when cleansed of statistical bias, do not reveal the extent to which the quality, the availability, and if the assortment of the goods and services produced match the requirements of domestic and foreign customers.

Governments which do understate statistical reform may gain significant benefits. First, because even partial economic reforms

² See John P. Hardt and Timothy Stanley, "Indicators of Change in Soviet Security Policy," the Atlantic Council, April 1989.

may reduce shortages and bring about an improvement in certain areas of performance, their neglect understates the positive contributions of reform, thereby reducing the chances that reforms would be considered, adopted, implemented, and appropriately assessed. Moreover, reporting accurate measures could advance the Conventional Arms for Europe (CFE) and START (Strategic Arms Reduction Talks) talks by making verification of defense cuts both transparent and identifiable at an early stage. Early agreement by both sides on existing force levels and current defense expenditures could build mutual confidence in each other's credibility and intentions to negotiate a treaty.

Ultimately, however, the benefits of undertaking statistical reform must outweigh the significant risks and potentially high short-term costs of doing so, particularly on the domestic front. The very publication of more accurate economic and social information will document the extent of the leaderships' past policy mistakes, information manipulation and the seriousness of current problems. This may weaken longstanding party leaders and, for the first time, will impose on the government and the party a degree of accountability for declining growth, low standards of living, deplorable environmental conditions, and inadequate health care. Moreover, as implementation of reform measures may initially lead to a deterioration of performance, open inflation and temporary unemployment, criticism by the populace is likely to increase. It is all the more necessary, therefore, to construct indices of performance that can illustrate several of the reform-related improvements in the quality, availability and assortment of goods and services produced.

SOURCES OF STATISTICAL BIAS

A combination of factors, outlined below by Fink and Havlik, contribute to distortions in East European statistical data. Statistical bias in CPE macro- and micro-economic analysis has often been attributed to systemic economic underpinnings and political motivations. On the macroeconomic level, East European economists in traditional CPE's tend to present statistics on the optimistic side utilizing information as a tool for internal and external public relations to illustrate the success of the socialist system. Reform-oriented CPE's have, however, tended to follow a strategy of understating national income in order to gain more preferential tariff and credit treatment. On the microeconomic level, statistical bias is introduced by enterprises which tend to overstate production in order to show fulfillment of the plan and thereby gain bonuses. At the same time, the practice of accepting statistics from the same officials who will be judged by those very statistics, creates and perpetuates a pervasive systemic bias toward the simulation of successful outcomes.

While purposeful statistical distortion is not a practice peculiar to Eastern Europe,³ Havlik and Fink explain that the methodolo-

³ The authors point out that such tendencies, at least at the enterprise level, are not restricted to Eastern Europe but exist in market countries as well, where enterprises tend to understate income to avoid payment of taxes—thereby ensuring that the firm accrues the greatest benefits possible.

gies for gathering and aggregating statistics in CPE's add to already existing statistical distortions. Significant methodological differences appear even at the most basic level of definition. The calculation and comparison of gross economic output is highly problematic; Western economists calculate Gross Domestic Product (GDP), which includes the value of final goods and services produced in a country in a given period of time while Eastern economists calculate Net Material Product (NMP), a measure which excludes the bulk of services included in the GDP measure. Conversion from Net Material Product (NMP) to Gross Domestic Product (GDP) is possible but is susceptible to distortions which include: "double-counting" based on a certain amount of overlap in the two accounting measures; conversion into convertible currencies such as the dollar, deutsche mark or yen—each, at any given time may be widely regarded as being overvalued or undervalued; and the application of irrational, proxy exchange rates which are assigned to East European countries for trading purposes. Finally, were all the politically motivated and methodological distortions removed from East European statistical information, the persistent lack of necessary data to complete analyses and comparative statistics present a major stumbling block to such efforts.

Fink and Havlik challenge the notion that the source of statistical distortions in East-West GDP comparisons is simply inaccurate East European statistics and argue that, in general, all international economic comparisons—whether between Western industrialized nations or between market and centrally planned economies are subject to divergences in classification, statistical units, definition of output, treatment of foreign trade in the statistical system and relative prices. In fact, they point out, problems in comparing Western economies were much more aggravated before a 1954 UN project was implemented to devise an internationally accepted standard for GDP comparisons.

In the case of East-West comparisons, politically motivated statistical bias and the inherent difficulties in intersystemic comparisons are further exacerbated by the absence of an internationally accepted framework for conducting East-West economic comparisons. In order to illustrate their point, Fink and Havlik outline several methods by which Western economists convert NMP to GDP, identifying the International Comparison Project (ICP) and Physical Indicators Global (PIG) methods. They argue that although, for example, the PIG method is clearly biased upward the bias is transparent and thus easily accounted for by the reader, while mixed approaches used by the World Bank, some academics, and the Central Intelligence Agency (CIA), are not transparent and are susceptible to errors in human judgment. One could argue that economic, social, and military decisionmaking, both domestically and in East-West negotiations will have a higher chance of error and less potential for verification until an internationally accepted theoretical framework for conducting East-West economic comparisons is conceived. Consequently, if East-West statistics are to be a subject of critique and negotiation within the CSCE Basket II process, all statistics—including those used by Western economists, may have to be reassessed.

ECONOMIC AND DEMOGRAPHIC TRENDS

It is against this background that Western scholars have attempted to clarify actual East European economic growth, social conditions, population trends, and military expenditures. In contrast to official East European statistics, the analyses by Alton, Eberstadt, and Baldwin reveal an Eastern Europe with rapidly declining economic and social conditions and the urgent need for systemic reform.

Eastern Europe has, since the 1960's, wrestled with steeply declining economic growth and labor productivity, according to Thad Alton. Poorly founded economic policies, widespread inefficiency, and a stubborn reluctance to embark on systemic reform are factors which have had a continuing negative impact on Eastern Europe's ability to grow. Alton concludes that, "Perestroika so far has not induced essential price reforms in Eastern Europe. Inflation is serious in Yugoslavia, Poland, and Hungary. Pricing is still a matter of social policy, especially for consumer necessities, and subsidies comprise a very large percentage of total state budget expenditures." In the absence of progress toward reform, the inability of the East European leaderships to tap their "unused economic and social potential" has evoked increasingly widespread criticism of the leaderships and of the system after years of apparent apathy by the indigenous population. Alton concludes that Eastern Europe's poor performance is directly linked to inefficiency and a lack of economic incentives and social benefits.

Nick Eberstadt points to a devastating, although veiled picture of health and mortality in the region: for the first time since World War II, the life expectancy of peoples living in the industrialized nations of Eastern Europe is not increasing and has even begun to fall. Eberstadt explains that while the absence of standardized practices has resulted in some differences in statistical data within Western countries, the difference between Western and East European measures are much greater. He identifies more narrowly defined East European reporting procedures and a consistent under-reporting of certain causes of death as major factors. For example, the German Democratic Republic does not report deaths from homicide, suicide, or accidents and "adverse effects" while Romania neglects to list infants as being born until after the first month of life, when most of the infant mortalities occur. Despite these shortcomings, Eberstadt's analysis shows that, "By the mid-1980's, age standardized death rates for men were over a third higher in Warsaw Pact Europe than Western Europe for men, and over two-fifths higher among women." Of those deaths, cardiovascular disease and cirrhosis of the liver have been identified as the major causes.

While some scholars have argued that the traumatic effects of World War II may play an important role in Eastern Europe's sharply different mortality rates, Eberstadt believes that the evidence points instead to the poor quality of health care, environmental conditions, and excessive smoking and consumption of alcohol as the more likely determinants. Much of this may be attributed to the health care system itself, which is based on the labor-intensive, low-cost approach of the Soviet model. While the current

health care system corresponds well to the needs of less developed countries, it cannot meet the needs of an urban, aging population in industrialized nations. Moreover, Eberstadt notes that despite these negative health trends in Eastern Europe more national resources continue to be allocated to health care in Western Europe. Combined, these factors have resulted in the recent reversal and current decline in East European life expectancy and increased infant mortality.

Godfrey Baldwin's analysis provides a look at demographic trends in Eastern Europe. He found that between 1950 and 1985 while the regional population increased in absolute terms the rate of population growth slowed considerably. Specifically, Baldwin found that the total population of the CMEA-Six, Yugoslavia, and Albania grew from 106 million persons in 1950 to almost 138 million in 1985, and is projected to grow to between 143 million and 155 million by the year 2010. Since the birth rate continues to decline, while the death rate stays relatively stable, the trend toward low-population growth is expected to continue in the future. As in the West, the median age of the population and the number of elderly people continue to rise. A closer look at individual country trends shows that Albania's population is increasing at a much faster rate than those of the other East European countries.

Baldwin's analysis also provides a demographic perspective on the nature of human constraints on economic performance. In the face of both declining population and labor productivity, the political leaderships must take steps to increase human motivation as one part of a plan to ensure long-term economic growth. Treating human resources as a limitless, disposable factor input has become an increasingly costly policy for Eastern Europe. The German Democratic Republic is to date the only country where migration was the most important factor in population change (net emigration from that country between 1950 and 1985 amounted to a loss of around 2.7 million persons, or about 15 percent of the 1950 population). But, the East German experience does suggest the potential for mass migration of East Europeans if, on the one hand, internal conditions are not improved but, on the other hand, the new CSCE rules allowing freedom of movement for individuals are implemented. In the 1990's, more resources will be required for health care, housing, and environmental concerns in order to protect and nurture what might be viewed, particularly in the technological/information age, as increasingly scarce human resources.

The analyses of economic and demographic trends presented in this section hold broad implications for Eastern Europe as leaders begin to formulate policies for the 1990's. The difficulties are formidable: developing policies which will meet the demands of restive populations demanding broad improvement in quality of life in a period of constrained resources while maintaining Soviet support and domestic stability. To the extent that a decision on the part of an East European government to reform statistical collection and reporting measures involves the potential for further destabilizing an already unstable domestic situation, a decision for reform by one of the East European countries may imply that it has crossed a critical threshold of commitment to reform. So far, no East Europe-

an country has taken this step toward comprehensive statistical reform.

PROSPECTS FOR STATISTICAL REFORM

Change in the quality of statistical analysis and reporting has been and will most likely continue to be slow. As with most reform, a first step requires that problems be identified; a second step requires a program of reform to be put together; and only as a third step can actual implementation of reform begin. Since the need for improved information in effectively reformed economies may not be as well appreciated as other aspects of reform, it is not yet clear even that the first or second steps have been taken by most East European nations. Nevertheless, East European economic planners and managers, interregional and international trading partners, and international organizations may now be well positioned to encourage statistical reform under the current umbrella of comprehensive reform throughout the CMEA-Six, Yugoslavia, and the Soviet Union. Clearly, the scope of change currently being discussed mandates statistical reform.

Fink and Havlik propose that statistical reform may move forward through the CSCE process, revision of the data printed in the annual Atlas of the World Bank, and reports of the Economic Commission for Europe of the United Nations. In addition, international actors with a vital interest in the region may take a more active role in promoting reform essentially by making preferential Western economic treatment conditional in part on progress in statistical reform. One leading example of such linkage may be found in World Bank and IMF policies which require that members submit national economic statistics—even if under special agreements of confidentiality as a precondition to membership and, subsequently, remaining in good standing.

ALTERNATIVE MEASURES OF GROWTH AND DEVELOPMENT LEVELS: COMPARISONS AND ASSESSMENT*

By Gerhard Fink and Peter Havlik**

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I. SUMMARY

Methodological, systemic, and political differences hamper the direct growth and level comparisons between the centrally planned economies (CPE's) and market economies (ME's). The official growth figures released by the CPE's are mostly biased upwards whereas the main obstacle to the level comparison is the lack of a proper convertor for converting the CPE's income in national currency into dollars. None of the available estimation methods is free from certain bias. The repricing method (ICP) requires the cooperation with national statistical offices (to which only three CPE's are ready at the moment) and the submitted data raise some doubts about proper quality accounting. The physical indicators global (PIG) method may be applied uniformly to all CPE's as it requires no detailed information about relative prices. Nevertheless, certain (most likely upward) bias cannot be excluded, too, because of the tendency to inflated output reporting in CPE's and quality problems similar to ICP method. Mixed approaches (Alton, CIA, Marer)

* The preparation of the paper has greatly profited from the discussion held at the Joint Economic Committee. Apart from that, we are grateful to Paul Marer and Friedrich Levčík for valuable comments. The responsibility for any errors is our own. For more details see the forthcoming research report by the same authors.

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cannot be recommended because the pitfalls inherent to every single method are further aggravated by the unequal treatment of countries compared. The authors prefer the PIG estimates and place the CPE's at par with less developed ME's: the GDR and Czechoslovakia near Italy and Spain; Hungary, the U.S.S.R. and Bulgaria near Greece and, finally, Poland, Romania, and Yugoslavia near Portugal and Argentina.

II. THE PURPOSE OF AND OBSTACLES TO EAST-WEST COMPARISONS

Comparisons of the level of real incomes have gained an importance which goes far beyond academic interest in knowing how the world looks. Financial contributions to international organizations, preferential customs duties, access to soft term credits, and other preferential conditions in international relations have been made dependent upon the economic strength of nations. Moreover an appropriate assessment of the economic strength of the U.S.S.R. plays an important role in the foreign policy design of the United States of America. Given this variety in economic and political interest it is no big surprise that a uniformly accepted comparison approach has yet been neither developed nor applied in East-West comparative economic studies.

The lack of reliable information regarding East-West comparative incomes stems not only from political differences, purely methodological variations, or differences in the coverage between statistical systems of both groups of countries: first of all any international economic comparison faces serious conceptual problems as to classifications, statistical units, definition of output, treatment of foreign trade in the statistical system, and relative prices. The problems of East-West comparisons are further aggravated by the differences in socioeconomic systems and in understanding what is considered as output: in ME's everything that finds a price on markets for goods and services is treated as output, in the CPE's only the production of tangible goods (and services related to the production of such goods) enters the national income. Both concepts do not deliver precise criteria of what has to be included into the national accounts.¹

It is well known that statistical information generally published by the CPE's leaves much to be desired as far as quantity and reliability of available data is concerned.² Just to address briefly the problem of statistical bias³ we might distinguish between biases in the statistical reporting emanating from national interests and from specific interests of the statistical units. The history of Hungary's, Poland's, and Romania's participation in the UN sponsored International Comparison Project (ICP) as well as discussions connected with their application for membership in the World Bank and IMF may serve as an example for the former. On the level of statistical reporting units (enterprises) we can observe that enter-

¹ Fink, Gerhard, "Zu den Methoden in der quantitativen system-vergleichenden Forschung," in Alfred Schüller (ed.), *Theoriebildung und empirische Forschung im Systemvergleich*, Berlin, 1987, pp. 61-78.

² CRS (1982), *Basket Two Compliance, East European Economic Statistical Quality*, CRS, May 1982.

³ For further information compare, e.g., Vanous, Jan, "Availability and Reliability of Indigenous Economic Statistics" in this volume.

prises in socialist countries often tend to overreport the main plan target (e.g., gross output, or net output) in order to reap premia for plan fulfillment, while in ME's there is a tendency to underreport profits in order to avoid taxation.

The commonly used statistical measures of the level of economic activity differ in East and West. The Gross Domestic Product (GDP) measure (the value of final goods and services produced in a country in a certain period) is usually not published by CPE's who mostly use an indicator of Net Material Product (NMP) for similar purposes.⁴ Though the methodological differences between the GDP and NMP are well documented and individual attempts to recalculate the GDP into NMP and vice versa were done, the conversion from NMP to GDP is by no means easy since necessary data are not generally available. Experience shows that the GDP may be as much as 10 to 15 percent higher than the corresponding NMP—the difference being greater in countries with higher incomes (and with a more developed service sector). The difference is also growing over time and may vary depending on the rules for establishing the depreciation charges. The diverging coverage of NMP and GDP indicators has, of course, an impact not only on absolute levels but on growth rates as well.

The pure conversion of NMP into GDP of an individual country unfortunately does not solve the main problem in international comparison of real incomes since the conversion of GDP (in national currency) into some common unit (e.g., U.S. dollars) is a far more difficult task. We take it for granted that ordinary exchange rates do not serve well for such purposes since they do not reflect real purchasing powers of national currencies even in ME's. The deviation of real purchasing power parity (PPP) from the market exchange rate (ER) became apparent especially after the introduction of floating exchange rates in 1973. Naturally, in the case of CPE's, market criteria play a much smaller role in establishing their official exchange rate, and such exchange rates are more often than not suited neither to secure a balanced current account nor do they reflect purchasing power parities: this finds its ultimate appropriate reflection in the nonconvertibility of CPE's currencies. It became apparent, especially after the publication of the recent study on CPE's national income statistics sponsored by the World Bank,⁵ that the establishing of proxy exchange rates for CPE's currencies forms the most serious bottleneck in East-West GDP comparisons. While it turned out that it is possible relatively precisely to estimate GDP's for these countries in their national currencies, it is the conversion of such data to some common basis which poses the greatest problems. Since official exchange rates under condition of nonconvertibility have no real economic meaning and there exists a bundle of other possible conversion coeffi-

⁴ Hungary, Poland, and Romania (all members of the World Bank and IMF) publish both indicators. Recently, the Soviet Union revealed for the first time the growth rate of GNP in 1987 (3.3 percent) and officially introduced the GNP into its statistical practice (see *Vestnik statistiki*, No. 6, 1988, pp. 30-42). Unofficial GNP estimates in Rubles have been already published as well (see Zotyeyev, G., "Ob otsenke natsionalnogo produkta," *Ekonomicheskaya gazeta*, No. 42, 1987, p. 10).

⁵ See Marer, Paul, "*Dollar GNP's of the U.S.S.R. and Eastern Europe*," The Johns Hopkins University Press, Baltimore, 1985.

cients used for different purposes, the choice of a "proper" convertor is really crucial.⁶

The numerical importance of a proper convertor may be illustrated by the fact that the error margin when converting the NMP to GDP in national currency units for Czechoslovakia turned out to be only +5.7 percent of GDP: recently published Czechoslovak data put the GDP at 535.6 bn Kcs in 1980⁷ as compared with estimated 556.1 Kcs.⁸ Soviet GNP has been estimated at 589.5 bn Rbl for 1980,⁹ the corresponding Soviet figure turned out to be 614.5 bn Rbl,¹⁰ i.e., the difference was only -4.1 percent. On the other hand, the relative difference between the lowest and highest possible GDP estimates for Czechoslovakia in 1980 expressed in U.S. dollars amounted to more than 260 percent. The big variance in dollar estimates was due to the wide variations in alternative convertors.¹¹ In the course of work on the World Bank project on GDP levels for CPE's it became clear that future research should be focused either on more plausible ways of assessing the real PPP's of CPE's national currencies or on some other methods, requiring no direct exchange rate conversions.

III. METHODS FOR BENCHMARK GDP ESTIMATES

Basically we can distinguish methods which require a convertor or try estimate GDP's directly. Methods relying on convertor either use purchasing power parities (e.g., ICP) or exchange rates (Marer); direct GDP estimates are based on quantitative indicators for which a correlation with GDP levels can be established (PIG method).

A. REPRICING METHOD—INTERNATIONAL COMPARISON PROJECT (ICP)

The basic ICP approach is as follows:¹² as a first step, the GDP of each participating country is broken down into a number of homogeneous commodity groups according to GDP final use components. Prices are then recorded within each basic heading for selected commodities and the average ratio between prices in different countries is calculated for each commodity group. The national values are then converted to internationally comparable (real) values with the help of these price ratios. The real value of total GDP is obtained by summing up the real values over the individual commodity groups. The resulting GDP is expressed in "internation-

⁶ For an overview of the main problems connected with ER in CPE's see van Brabant, Jozef, "Exchange Rates in Eastern Europe: Types, Derivation, Application," *World Bank Staff Working Paper No. 778*, The World Bank, 1985, and Wolf, Thomas A., "Exchange Rates, Foreign Trade Accounting and Purchasing Power Parity for Centrally Planned Economies," *World Bank Staff Working Paper No. 779*, The World Bank, Washington, DC, 1985.

⁷ Nachtigal, V., "O pojeti národního duchodu a produktivní práce," *Politická ekonomie*, No. 6, 1987, pp. 597-616.

⁸ Havlik, P., Levčík, F., "GDP of Czechoslovakia, 1970-1980," *World Bank Staff Working Paper No. 772*, The World Bank, Washington, DC 1985.

⁹ Campbell, Robert W., "The Conversion of National Income Data of the U.S.S.R. to SNA Concepts in Dollars and Estimation of Growth Rate," *World Bank Staff Working Paper No. 777*, The World Bank, Washington, DC, 1985.

¹⁰ Zotyeyev, G., "ob otsenke natsionalnogo produkta," *Ekonomicheskaya gazeta*, No. 42, 1987, p. 10.

¹¹ See Havlik and Levčík, op. cit., p. 31.

¹² See Kravis, Irving B., Heston, Alan, and Summers, Robert (1982). "World Product and Income: International Comparisons of Real Gross Product" (Baltimore and London: The Johns Hopkins University Press for the World Bank, 1982).

al" currency (e.g., international dollars, schillings) of the benchmark year.

Hungary is the only CMEA country participating in all phases of ICP (Poland and Romania participated in Phases III and IV, Romania decided against publication of its data for Phase IV and did not participate in Phase V). At present there is a slight hope that more CPE's will participate in the future: Czechoslovakia recently expressed serious interest to join ICP for 1990 (and will perhaps even supply data for 1985 ICP comparison as well), the Soviet Union may join the ICP for 1995. Unfortunately—as the number of participating countries has been increasing—the timespan between the year of comparison and availability of results has been growing.¹³

It is broadly recognized that the ICP results doubtlessly could give the best possible basis as far as international comparability of participating countries is concerned, not only at the global GDP level but also in the GDP final use components. This method, however, can be applied only in close cooperation with the central statistical offices of the countries involved. Not given the willingness to cooperate in a number of CPE's, the method, unfortunately, does not help to solve the problem of comparing real GDP levels between ME's and all European CPE's. At present only Hungarian, Polish, and Yugoslav data are available. Moreover, there are still serious problems in comparisons of countries from different regions, inter alia because of limited resources and therefore fewer exchanges of experts among regional groups.¹⁴

B. PHYSICAL INDICATORS GLOBAL (PIG) METHOD

The PIG approach is based on identified relationships between various physical indicators and the level of per capita GDP in ME's. This method, originally devised by Hungarian scholars,¹⁵ is particularly suited for estimation of internationally comparable income levels in different (both from a sociopolitical and economic point of view) countries since it produces reasonable results at relatively modest costs and does not require intensive cooperation between national statistical offices. Moreover, the PIG method avoids some of the most important obstacles to international comparability, like for instance the different scope of traditional GDP/NMP measures, unrealistic or completely inadequate exchange rates of national currencies with respect to the U.S. dollar and so on.¹⁶ No less advantageous is also the fact that by this method uniform cri-

¹³ The results for 1980 (Phase IV) were published in 1986 only (see "World Comparisons of Purchasing Power and Real Product for 1980," *United Nations*, N.Y., 1986). The preliminary results for the European comparison for 1985 were published at the end of 1987 (see Auer, J., "Ergebnisse bilateraler Wirtschaftsvergleiche mit Polen. Ungarn und Jugoslawien für das Jahr 1985," *Statistische Nachrichten*, No. 12, 1987, pp. 957-962).

¹⁴ See World Comparisons, op. cit., p. 1.

¹⁵ See Janossy, F., "A gazdasági fejlettség mérhetősege és új mérési módszere," *Közgazdasági és Jogi Könyvtár*, Budapest, 1963, and Ehrlich, E., "Comparison of development levels: inequalities in the physical structures of national economies," *VIIIth International Economic History Congress*, Edinburgh, August 1981.

¹⁶ See "Comparative GDP Levels" in *Economic Bulletin for Europe*, vol. 31, No. 2 (New York: United Nations, Economic Commission for Europe, 1980), and Havlik, P., "Comparison of Real Products Between East and West, 1970-1983," *The Vienna Institute for Comparative Economic Studies*, Research Report No. 115, April 1986.

teria are applied to the whole sample of countries compared: no other method could so far claim the same.

Numerous problems with the selection of appropriate nonmonetary indicators, estimation of adequate model relationships, and, if estimated for each indicator separately, with the aggregation of partial GDP estimates arise. Nevertheless, the critical point of the method will be met as we move on to the actual purpose of the whole exercise, namely to the extrapolation of GDP's for countries outside the core sample (which either release no or only unreliable GDP data). Here we need to adopt the crucial assumption that the estimated core sample relationships are valid outside the core as well and, therefore, may be used for meaningful extrapolations. One important additional argument against such extrapolations, namely, that the method is "transplanting" patterns valid for the ME's on different socioeconomic conditions of CPE's, cannot be easily dismissed. Of course these conditions are different in CPE's (alas, otherwise we would not estimate their GDP's in such a roundabout way), but in this case such "transplantation" should not be necessarily viewed as an obstacle to the method, but rather as a tool providing additional analytic insights into varying structural patterns of both economic systems. In other words, the global level of economic development should be treated independently of both socioeconomic and structural conditions of its origin.

A great number of various nonmonetary (physical) indicators correlate in some way with GDP. However, the indicators selected for partial estimates should serve as a good sample representation for the characterization of global income. The sample should be large enough to represent each of the structural elements of GDP as outputs, inputs, consumption, investment, etc. In theory, one should select a random sample from all possible nonmonetary indicators related to GDP, but in practice we are limited by the availability of international statistics. The number of selected indicators should be sufficiently large, since the larger the sample the less important—for purely mathematical reasons—is the problem of weighting when partial estimates have to be aggregated. The market economies in the sample should include developing countries to catch some of the quality variations by the estimated parameters, and finally, in order to avoid the exchange rate bias, the GDP's of the countries in the core sample should be converted into dollars with purchasing power parities (results from ICP) rather than with current exchange rates.

C. OTHER APPROACHES

Another method had been used by the World Bank in its Atlas between 1977-80. The criticism of the Atlas method inspired the World Bank to launch the research project on national income statistics in CPE's and subsequently to stop publication of GDP data for nonmember CPE's in the following issues of the Atlas. The World Bank sponsored project¹⁷ has greatly facilitated the understanding of the main problems related to East-West GDP compari-

¹⁷ See Marer, *op. cit.*

sons, but it has not produced acceptable dollar estimates of comparable GDP levels for CPE's.

Marer's task was to summarize the findings of individual country studies and to present GDP estimates for all CPE's in a way which would allow a direct comparison with other countries included in the World Bank Atlas. As mentioned above, the exercise was successful in calculating GDP estimates in individual countries' national currencies. There was also a broad agreement among country experts that PPP-like convertors would be preferable in order to obtain CPE's GDP values in common units. However, the available PPP information has been rather mixed: for Hungary, Poland, and Romania the ICP results for 1975 have been used, for Czechoslovakia a bilateral comparison of consumption with Austria and FRG for 1980, for GDR a bilateral comparison with FRG for 1980, and for the Soviet Union a bilateral comparison with the U.S.A. for 1976. No PPP information has been available for Bulgaria, so no GDP in dollars could be estimated.

In order to get the required "Atlas-type" GDP estimates comparable with ME's, an adjustment of PPP's to proxy exchange rates has been performed with the help of estimated exchange rate deviation bias. Finally, these adjusted PPP's have been used for the conversion of GDP from national currencies to U.S. dollars. The logic of the argument was as follows: since the World Bank uses official exchange rates for conversion of national GDP data for marker economies, and there is a systematic discrepancy between PPP and exchange rate, a proxy exchange rate had to be used for CPE's as well. In order to assign the CPE's what was considered an appropriate place in the per capita GDP ranking a similar adjustment (i.e., lowering the per capita GDP estimate) has been applied. The variety of economic arguments to explain the observed gaps between exchange rates and PPP's (poor export performance, weak marketing capabilities, etc.) needs only to be supplemented by one more argument: the national interest to remain eligible for the main lending program of the World Bank.

As much as can be concluded from the available publications, the CIA also uses heterogeneous methods in determining the Soviet and East European GDP/GNP levels.¹⁸ Dollar GNP benchmark estimates for Hungary, Poland, Romania, and Yugoslavia are currently taken from ICP (data for 1975). Adjusted ECE 1970 benchmark PIG estimates are used for Bulgaria, Czechoslovakia, and the GDR. Alton's estimates are then used for obtaining the time series in 1975 dollars (see below): the values in current dollars are obtained by applying the U.S. GNP deflator. A separate estimation procedure is used for the Soviet Union: the quantity output data (mostly from Soviet sources) and value-added weights are used for the compilation of GNP. The resulting ruble estimates are then converted with a separately constructed PPP-like convertor for 1982.¹⁹ As a result, CIA's dollar GNP estimates for Eastern coun-

¹⁸ See "Handbook of Economic Statistics, 1987," CIA, U.S. Government Printing Office, Washington, DC, 1987.

¹⁹ For details see *Handbook of Economic Statistics*, op. cit., p. 35, and Edwards, I., Hughes, M., and Noren, J., "U.S. and U.S.S.R.: Comparisons of GNP," *Soviet Economy in a Time of Change* in Joint Economic Committee, vol. 1, October 1979, pp. 369-401.

tries as a group also stem from three different sources. A mixed approach is used by Summers and Heston as well.²⁰

To conclude this overview of various methods used in GDP comparisons for CPE's it is necessary to mention additional efforts made by international organizations. First of all, the U.N. Secretariat undertakes its own GDP estimates (also for CPE's), but uses them for strictly internal purposes and nothing is known about either methods or results. Second, the CMEA Secretariat in Moscow makes intra-CMEA NMP comparisons also for internal use only. We are told that the methodology is similar to that of ICP, but the numerical results are not published.²¹

IV. ESTIMATION OF GROWTH RATES

There is wide agreement that official growth indexes published by CPE's are upward biased, mainly because the price increases are not sufficiently reflected in deflating current price series. The evidence that official data contain a considerable amount of hidden inflation is numerous. Basically, there are two possibilities how to extrapolate benchmark GDP estimates. One can take the latest equations obtained by the PIG method, plug in the physical indicators for the extrapolation period and compute resulting GDP's. Or alternatively, one can take the last benchmark GDP estimates, and with appropriate growth rates move the benchmarks to the future (Alton, CIA). In the first case one has to assume the stability of GDP/nonmonetary indicator relationships during the period in question, the second method requires plausible information about (or estimates of) growth rates.

A. EXTRAPOLATIONS USING BENCHMARK PIG ESTIMATES

The estimated benchmark PIG equations cannot be used for direct extrapolations without adjustment.²² Estimated equations for earlier years deliver systematically lower GDP levels than estimated equations for later years. For example, the difference between GDP estimates in equations using 1975 data versus those using 1980 data came to between 7 and 9 percent for the majority of countries, and only for Finland and Sweden it was greater than 10 percent. This is an important finding since it has direct implications for possible extrapolations. It corresponds also with observations of Boretsky who shows that growth rate extrapolations with baskets of quantity data tend to underestimate the growth rate.²³ A constant basket of quantitative indicators becomes less representative over time, simply because new products emerge and the share of services in GDP increases over time. This feature is captured by the PIG method when new equations are estimated for

²⁰ See Summers, R., Heston A., "A new set of international comparisons of real product and price levels estimates for 130 countries, 1950-1985," *The Review of Income and Wealth*, No. 1, March 1988, pp. 1-26.

²¹ See Ancyferova, L., Zarubin, G., "K provedeniyu mezhdunarodnykh sopostavleniy vazheyskikh ekonomicheskikh pokazatelyi strantschlenov SEV", *Vestnik statistiki*, No. 2, 1984, pp. 47-55, and Rajewski, Z., "Miedzynarodowe porownania wielostronne realizowane w ramach RWPG", *Wiadomosci statystyczne*, No. 6, 1985.

²² See Havlik (1986), op. cit., p. 47.

²³ See Boretsky, M., "The Tenability of the CIA Estimates of Soviet Economic Growth," *Journal of Comparative Economics*, 11, 1987, pp. 517-542.

benchmark years. So far no experience is available whether the PIG method would also deliver appropriate annual growth rates if estimates were made on an annual basis.

B. EXTRAPOLATIONS WITH ADJUSTED GROWTH RATES

Assuming that identical (or equally representative) baskets of goods were used for both PPP and national inflation measurement, the relative change of PPP for two countries in a certain period should be equivalent to the ratio of the respective rates of inflation.²⁴ Obviously, if rates of inflation in two countries are the same, the PPP of their currencies remains unchanged. The higher the inflation in country *a*, the lower will be the purchasing power of its currency in terms of currency *b* in the subsequent period. A similar argument is valid also for relative GDP levels: GDP values at international dollars of year *i* may thus be obtained from values expressed in dollars of year *j* with appropriate growth rates of countries compared, after adjustment for the rate of inflation measured in international dollars.

C. GROWTH RATES' ESTIMATES

A check how both ICP and PIG estimates performed in the period 1975–80 as far as the real per capita GDP growth rates are concerned has shown that the correspondence between official and estimated growth rates was good for ME's. Generally, the PIG estimates of growth rates performed better than ICP estimates. At present we are not in a position to give the reasons for this feature since there seemed to be no systematic bias introduced either by ICP or PIG methods, at least for the majority of ME's for which reliable official growth rates are available.²⁵ The widening gap between ICP estimates for Hungary and Poland and the other methods in the three consecutive benchmarks 1975, 1980, and 1985 raises some concern about quality adjustments in ICP: the available ICP-based growth rates for Hungary, Poland, and Yugoslavia seem to underestimate the real development: during 1975–80 the ICP suggests that Hungary's and Poland's per capita GDP dropped by 8.4 percent and 15.3 percent respectively, that of Yugoslavia grew by 9.9 percent. Official figures report a growth by 15.3 percent (Hungary), by 1.4 percent (Poland) and by 25.9 percent (Yugoslavia). See Table 1.

²⁴ In reality this is, of course, never exactly the case (see Szilagyi, G., "Updating Procedures of International Comparison Results," *The Review of Income and Wealth*, No. 2, June 1984, pp. 153–165) but, in practice, the two indexes should not deviate from each other too much. The indicated relationship has been used for both checking the officially reported inflation (see, e.g., Havlik, P., "A Comparison of Purchasing Power Parity and Consumption Levels in Austria and Czechoslovakia," *Journal of Comparative Economics*, 9, 1985, pp. 178–190) and for extrapolating PPP's (see Kravis et al. (1982), op. cit.).

²⁵ See Havlik (1986), op. cit., p. 55.

TABLE 1.—ALTERNATIVE GDP PER CAPITA GROWTH ESTIMATES

[In percent to the base year]

| | 1975-80 | | | 1980-85 | | | 1975-85 | | | |
|----------------------------|----------------|-------|-------|---------|----------------|------------------|---------|----------------|------------------|-------|
| | Official (NMP) | ICP | PIG | Alton | Official (NMP) | ICP ¹ | Alton | Official (NMP) | ICP ¹ | Alton |
| Bulgaria | 132.6 | | 123.1 | 103.4 | 119.1 | | 102.9 | 157.9 | | 106.4 |
| Czechoslovakia | 118.7 | | 114.6 | 107.7 | 107.7 | | 104.9 | 127.8 | | 113.0 |
| German Democratic Republic | 123.3 | | 116.6 | 112.9 | 125.5 | | 110.3 | 154.7 | | 124.5 |
| Hungary | 115.3 | 91.7 | 114.7 | 108.5 | 107.4 | 83.3 | 104.3 | 123.8 | 76.4 | 113.2 |
| Poland | 101.4 | 84.6 | 114.2 | 99.0 | 92.1 | 70.0 | 98.2 | 93.4 | 59.2 | 97.2 |
| Romania | 135.3 | | 118.9 | 116.0 | 121.4 | | 106.9 | 164.2 | | 123.9 |
| U.S.S.R. | 118.5 | | 118.1 | | 114.2 | | | 35.3 | | |
| Yugoslavia | 125.9 | 109.9 | 119.9 | | 102.0 | 90.3 | | 128.4 | 99.2 | |
| United States | 112.0 | 112.3 | 111.5 | | 110.0 | 110.8 | | 123.2 | 124.4 | |
| Austria | 118.5 | 121.6 | 117.5 | | 107.4 | 94.6 | | 127.3 | 115.0 | |

¹ Preliminary.

Sources: national statistics, Alton, T.P., "Comparison of Overall Economic Performance in the East European Countries". NATO Economic Colloquium, Brussels, 1988, Tables 2-3 (U.S. GNP price deflator used for the adjustment to constant price basis), own calculations of per capita growth rates.

For CPE's as a group, only the PIG-based growth rates are available for a comparison with official (mostly NMP-based) per capita growth during 1975-80. With the exception of Poland the officially published growth rates were systematically higher than the estimated ones. The difference was especially large for (in descending order) Romania, Bulgaria, the GDR, and Yugoslavia, and a relatively small one for Czechoslovakia. For Hungary and the Soviet Union the difference amounted only to about 0.5 percentage points. This finding corresponds fairly well to the general perception about the "quality" of the individual CPE's statistical reportings.²⁶

Estimates of growth rates for six East European countries are regularly computed by Alton's group.²⁷ Here, more or less, independent estimates of sectoral indexes of output growth for the various production and service sectors are derived from national statistics and then aggregated into an index of GDP with weights reflecting estimated sectoral contributions to GDP in terms of so-called "adjusted factor costs" of a particular base year. The Alton group does not compute GDP estimates for the U.S.S.R. and Yugoslavia. A summary of results presented in Table 1 shows that these estimates are lower than both the official (NMP) growth rates and the PIG estimates, but higher than results implied by the ICP.

The difference between official and estimated growth rates is particularly striking when data for longer periods of time are being compared. A systematic bias in official CPE's growth rates prevents us from using such data for direct extrapolations along the above described lines. The degree of bias in official growth indexes is different in individual CPE's. Hungary probably has the most reliable statistics, whereas Romania, the GDR (and perhaps also the Soviet Union according to the latest revelations of "glasnost") are on the opposite side of the spectrum as far as the quality of statistical reporting is concerned.

²⁶ It must be remembered that NMP growth should in theory be lower than that of GDP owing to the higher growth rate of services (not fully covered by NMP).

²⁷ See, for instance, Alton, T.P., "East European GNP's: Origins of Product, Final Uses, Rates of Growth, and International Comparisons," in Joint Economic Committee, U.S. Congress. *East European Economics: Slow Growth in the 1980's*, vol. 1, Oct. 28, 1985, pp. 81-132.

V. SOURCES OF BIAS

A. PURCHASING POWER PARTIES (ICP)

ICP quantity and price comparisons have been criticized particularly as far as the treatment of nontradable products and services are concerned (e.g., government sector, education, health) and we shall not repeat this criticism here.²⁸ Rather, we mention possible sources of bias which may directly affect the results of ICP (and other PPP-based) comparisons as far as the comparability between CPE's and ME's is concerned. The accounting of (sometimes substantial) quality differences probably plays the foremost role and in future might be used more broadly by Eastern statistical offices to produce the desired lower level of per capita income. Second, much higher prices at various grey and black markets (which are increasingly important in CPE's since a number of goods is only in limited supply at official retail outlets) are not sufficiently taken into account. Relying mostly on information provided by individual governments, some price inputs to ICP may have been deliberately distorted, too.²⁹

Though the ICP methodology is designed to prevent precisely such sources of distortion and has been perfected over time, the limited possibility of independent controls of price/quality data supplied by individual CPE's governments leaves the possibility open of a quality bias in any direction. In addition, all quality assessments raise numerous problems with the selection of the appropriate relationship between the price and marginal utilities. More often than not the relatively "minor" differences in design, fashion, etc., may lead to "overproportional" reductions in prices, especially on saturated markets. Some products may still serve well for certain purposes in supply-constrained CPE's even if they would be hardly marketable in advanced market economies. In addition, the production of goods, even if inferior to products of highly sophisticated markets, has generated income in the respective country. Finally, the quality of goods consumed by (or durables in use of) the lower income groups in richer economies might also deviate significantly from the quality otherwise accessible to the average consumer. All these questions rather suggest either to avoid large quality adjustments and/or to base quality adjustments not on a comparison between a CPE and a highly developed ME (such as the U.S.A. or Austria), but rather between a CPE and a country of comparative level, such as Argentina, Greece, or Spain.

B. PIG ESTIMATES

Two types of physical indicators can be linked to the level of GDP: flows and stocks. Flows are typical output figures whereas stocks are only indirectly related to income. It is assumed that with a given level of income the population can afford to maintain certain stocks. Flow-based indicators deliver systematically higher partial GDP estimates for CPE's, thus a greater weight of flow-type indicators in the sample of physical indicators may push the global

²⁸ See, for instance, Kravis et. al., op. cit.

²⁹ See Marer, op. cit., p. 37.

GDP levels for CPE's up (relative to the generally more balanced ME's) and vice versa. Thus, for instance, taking only stock-type indicators, one would get results up to 14 percentage points lower (for Romania) than by global GDP estimates based on the whole sample of physical indicators for 1980.³⁰

Critics of the PIG method raise (apart from conceptual problems) mainly the following objections: difficulties with weighting, poor comparability of physical indicators from the qualitative point of view and the systemically inherent inefficiencies as possible sources of bias in PIG-based international comparisons of real products.³¹ Havlik attempted to show both the impact of different weighting as well as the bias resulting from possible systemically inherent inefficiencies by splitting and regrouping the global PIG estimates.³² It turned out that critics of the PIG approach are right when claiming that the system specific economic conditions prevailing in CPE's may lead to systematically higher GDP estimates for these countries if mainly flow type indicators and/or production inputs are used in the estimates.³³

CPE's economies base their management and reward schemes on formal plan fulfillment which—contrary to ME's—inherently stimulate inflated reporting of output: in recent years some CPE's have also introduced plan targets on material and energy saving which may possibly lead to underreporting of inputs used instead of overreporting in the future. A somewhat different situation prevails with indicators which refer to more complex products and services and have—as may be argued—increasing importance with the rising level of development. Thus, for instance, the partial GDP estimates based on the degree of saturation with TV sets would look substantially different if estimated from data on color TV sets only. Even the relatively low stocks of passenger cars in CPE's (with the exception of Yugoslavia) would look much worse if adjusted for differences in quality: Skoda, Trebant, and Lada are qualitatively inferior to Fiat, Ford, Toyota, or VW cars most frequently driven in ME's. On the other hand we have to bear in mind that the average quality of durables in use in developing countries (or, generally, used by lower income groups in ME's) is significantly below the average standards of highly developed ME's, too.

C. MIXED APPROACHES (ALTON, MARER, CIA)

Wide divergencies in data availability for individual CPE's mostly prohibit to use more sophisticated estimation method which could be uniformly applied for all CPE's. Four of them are members of the World Bank (Hungary, Poland, Yugoslavia, and Romania), the former three also participate regularly in the ICP. For some CPE's various bilateral comparisons with ME's were undertaken (e.g., Czechoslovakia-Austria, GDR-FRG, U.S.S.R.-U.S.A.,

³⁰ See Havlik (1986), op. cit., p. 63.

³¹ See, for instance, Marer, op. cit., pp. 95-98.

³² See Havlik (1986), op. cit.

³³ An ex-post check of partial GDP estimates (based on the sample of 30 physical indicators for 1980 used by Havlik) revealed that essentially no statistical bias existed: the estimated equations passed the most important tests of modern econometrics; the resulting partial GDP estimates were normally distributed (see Havlik (1986), op. cit., and the forthcoming research report).

etc.). Almost no suitable data are available for Bulgaria. This situation makes it extremely difficult to get comparable results both for CPE's within their group and relative to ME's. Since none of the existing methods is free from bias, mixed procedures most likely contain distortions which are inherent not only to every single method, but in their combination may impede comparability even within the group of CPE's. Whereas at least the direction of likely bias inherent to each particular method can be more or less clearly identified, the same task is much more difficult when countries compared are treated differently.

It is certainly not very satisfactory when the current GNP estimates provided by the CIA for the smaller East European countries are based partly on benchmarks for 1970, and three different estimation methods are applied for CPE's as a group.³⁴ The estimation of growth rates by the Alton group depends (as any other method) also on data provided by the CPE's. For those countries, which report a sufficiently large and reliable sample of quantitative data (e.g., Hungary and Poland), a tendency of underestimating the growth creeps in as the sample becomes less representative over time. For other countries (e.g., Bulgaria, the GDR, and Romania), where the lack of quantitative data has to be compensated by the officially reported (most likely upward based) indexes, an overestimation of growth rates may occur. Although the bias in estimated annual growth rates may not be too large, a more distorted picture of the relative GDP levels emerges as the bias is cumulated over longer periods of time. The solution provided by Marer may be disputed on similar grounds.³⁵ On the whole, mixing of various methods in estimating comparable GDP levels for GPE's cannot be recommended.

VI. OVERVIEW OF AVAILABLE GDP ESTIMATES

A. WESTERN ESTIMATES

There are plenty of independent Western estimates of CPE's development levels and only the most important ones can be dealt with here. Some vary by great margins, but as there are no clearly defined criteria for the selection of any best variant, none of them can be unequivocally recommended. As pointed out by Marer, the only test that can be currently applied is that of plausibility, consistency of growth rates and the juxtaposition of alternative figures.³⁶ Within this approach one must take note mainly of the varying scales (prices, estimation methods, etc.) on which alternative estimates are expressed. For an illustration we present different estimates for 1980 and 1985.

³⁴ See *Handbook of Economic Statistics*, op. cit., p. 35.

³⁵ See Marer, op. cit., pp. 116-117.

³⁶ See Marer, op. cit., p. 6.

TABLE 2.—ALTERNATIVE GDP PER CAPITA ESTIMATES (YEAR 1980)

[In current dollars and percent]

| | ICP | | | Summers/Heston | | | Marer | | | Alton | | | Havlik | | |
|----------------------------------|---------|------------|----------------|----------------|------------|----------------|---------|------------|----------------|---------|------------|----------------|---------|------------|----------------|
| | Dollars | USA = 100% | Austria = 100% | Dollars | USA = 100% | Austria = 100% | Dollars | USA = 100% | Austria = 100% | Dollars | USA = 100% | Austria = 100% | Dollars | USA = 100% | Austria = 100% |
| Bulgaria | | | | 4,904 | 43.0 | 59.6 | | | | 5,179 | 41.0 | | 5,535 | 55.3 | 70.5 |
| Czechoslovakia | | | | 7,002 | 61.4 | 85.1 | 4,740 | 41.7 | 46.3 | 6,971 | 55.2 | | 6,588 | 65.8 | 83.9 |
| German Democratic Republic | | | | 7,891 | 69.2 | 95.9 | 5,910 | 52.0 | 57.8 | 8,034 | 63.6 | | 7,050 | 70.4 | 89.8 |
| Hungary | 4,632 | 40.5 | 53.7 | 5,508 | 48.3 | 66.9 | 4,390 | 38.6 | 42.9 | 6,008 | 47.5 | | 5,881 | 58.7 | 74.9 |
| Poland | 4,322 | 37.8 | 50.1 | 5,006 | 43.9 | 60.8 | 3,730 | 32.8 | 36.5 | 5,528 | 43.7 | | 5,241 | 52.3 | 66.7 |
| Romania | | | | 3,946 | 34.6 | 47.9 | 2,680 | 23.6 | 26.2 | 4,297 | 34.0 | | 4,623 | 46.1 | 58.9 |
| USSR | | | | 5,626 | 49.3 | 68.4 | 4,190 | 36.9 | 41.0 | | | | 5,847 | 58.4 | 74.5 |
| Yugoslavia | 4,042 | 35.3 | 46.9 | 4,733 | 41.5 | 57.5 | 2,620 | 23.1 | 25.6 | | | | 4,555 | 45.5 | 58.0 |
| United States | 11,447 | 100.0 | 132.7 | 11,404 | 100.0 | 138.6 | 11,360 | 100.0 | 111.0 | 12,640 | 100.0 | | 10,018 | 100.0 | 127.6 |
| Austria | 8,625 | 78.3 | 100.0 | 8,230 | 72.1 | 100.0 | 10,230 | 90.1 | 100.0 | | | | 7,853 | 78.4 | 100.0 |

Sources: World Comparisons (1986). Summers and Heston (1988), Marer (1985)—best (mid-point) estimates, Alton (1985)—at 1981 dollars and Havlik (1986), as revised.

The ICP results for 1980 are on the low side when compared with Havlik's PIG estimate, but in accordance with other sources as far as the ranking of Hungary and Poland is concerned. (See Table 2.) Generally, there seem to be less problems with intra-CPE's ranking: all authors place the GDR and Czechoslovakia in first and second place, respectively. Then follow three country-pairs: Hungary and the U.S.S.R., Poland and Bulgaria, and Romania and Yugoslavia. The establishment of the lag behind the ME's is much more difficult. Marer puts all CPE's about 20 percentage points lower with respect to the U.S.A. (and about 30 percentage points lower with respect to Austria than Havlik and ICP). The difference is to be explained by Marer's "proxy-exchange" rate scale (versus PPP-based-PIG-modified scale used by Havlik) which produces different absolute GDP levels because of the "exchange rate deviation bias" between ER's and PPP's. This difference should remind the reader once more of the necessity to examine carefully any GDP data before making quick judgements.

TABLE 3.—ALTERNATIVE GDP PER CAPITA ESTIMATES (YEAR 1985)

(In current dollars and percent)

| | ICP (Auer) | | | World Bank | | | Summers/Heston | | | CIA | | | Alton ¹ | | |
|------------------------------------|------------|------------|---------------------|------------|------------|---------------------|----------------|------------|---------------------|---------|------------|---------------------|--------------------|------------|---------------------|
| | Dollars | USA = 100% | Aus- tria = 100% | Dollars | USA = 100% | Aus- tria = 100% | Dollars | USA = 100% | Aus- tria = 100% | Dollars | USA = 100% | Aus- tria = 100% | Dollars | USA = 100% | Aus- tria = 100% |
| Bulgaria..... | | | | | | | 6,652 | 40.8 | 57.3 | 6,492 | 39.2 | 61.2 | 6,760 | 38.9 | ..... |
| Czechoslovakia..... | | | | | | | 9,659 | 59.2 | 83.2 | 8,918 | 53.9 | 84.1 | 9,270 | 53.3 | ..... |
| German Democratic Republic..... | | | | | | | 11,371 | 69.7 | 97.9 | 10,714 | 64.7 | 101.0 | 11,190 | 64.3 | ..... |
| Hungary..... | 5,019 | 30.4 | 47.3 | 1,940 | 11.8 | 21.2 | 7,500 | 46.0 | 64.6 | 7,570 | 45.7 | 71.3 | 7,900 | 45.4 | ..... |
| Poland..... | 3,939 | 23.9 | 37.1 | 2,120 | 12.9 | 23.2 | 6,392 | 39.2 | 55.0 | 6,587 | 39.8 | 62.1 | 6,900 | 39.7 | ..... |
| Romania..... | | | | | | | 5,559 | 34.1 | 47.9 | 5,541 | 33.5 | 52.2 | 6,020 | 34.6 | ..... |
| USSR..... | | | | | | | 8,152 | 50.0 | 70.2 | 7,910 | 47.8 | 74.5 |  |  | ..... |
| Yugoslavia..... | 4,743 | 28.8 | 44.7 | 2,070 | 12.6 | 22.6 | 6,587 | 40.4 | 56.7 | 5,935 | 35.8 | 55.9 |  |  | ..... |
| United States..... | 16,494 | 100.0 | 155.5 | 16,400 | 100.0 | 179.2 | 16,304 | 100.0 | 140.4 | 16,557 | 100.0 | 156.1 | 17,400 | 100.0 | ..... |
| Austria..... | 10,610 | 64.3 | 100.0 | 9,150 | 55.8 | 100.0 | 11,612 | 71.2 | 100.0 | 10,610 | 64.1 | 100.0 |  |  | ..... |

¹ Year 1986.

Sources: Auer (1987), The OECD Observer, No. 145 (1987), World Bank Atlas (1987), Handbook of Economic Statistics (1987), Alton (1988), Summers and Heston (1988).

World Bank data for 1985 are completely below any acceptable limits: ICP results are still incomplete because currently only data from the European Comparison Project are available (that is the reason why we could not compute our PIG estimates for 1985 yet). The final ICP results (the inclusion of developing countries) will push upwards the GDP levels of Hungary, Poland, and Yugoslavia. The remaining three sets of estimates in Table 3 are very close since they are based on similar benchmarks.

B. RESULTS AVAILABLE FROM CPE'S

As an illustration we shall present also GDP comparisons originating from CPE sources. (See Table 4.) The first appeared in the official CMEA Secretariat journal in the form of data on precen-tual intra-CMEA NMP distribution in 1981,³⁷ and the comparison in terms of relative NMP per capital may be easily derived with the help of available population data. However, the CMEA authors do not explicitly specify how their NMP distribution was established. Another set of GDP estimates, provided by Bulgarian scholars, relates directly to the PIG methodology: the authors applied factors analysis and correlation techniques to data on 13 physical indicators in a sampe of 34 countries in order to estimate GDP per capita at 1975 U.S. dollars for the years 1970, 1975, and 1980.³⁸

TABLE 4.—COMPARISON WITH GOP PER CAPITA RANKINGS COMPUTED BY EXPERTS FROM CPE'S

| | [In percent] | | | | |
|----------------------|--|--|---------|------------------------------------|---------|
| | NMP per capita in 1981 (Valeshko et. al.) | GDP per capita in 1980 (Kostov and Videnov) | | GDP per capita in 1980 (Havlik) | |
| | | GDK=100 | GDR=100 | USA=100 | GDR=100 | USA=100 |
| Bulgaria | 72.1 | 62.0 | 41.6 | 78.5 | 55.3 |
| Czechoslovakia | 85.5 | 93.4 | 62.7 | 93.4 | 65.8 |
| GDR | 100.0 | 100.0 | 67.1 | 100.0 | 70.4 |
| Hungary | 67.7 | 70.6 | 47.4 | 83.4 | 58.7 |
| Poland | 63.4 | 70.8 | 47.5 | 74.3 | 52.3 |
| Romania | 68.7 | 48.6 | 32.6 | 65.6 | 40.1 |
| USSR | 73.4 | 89.1 | 59.8 | 82.9 | 58.4 |
| Yugoslavia | | 39.3 | 26.4 | 64.6 | 45.5 |
| USA | | 149.0 | 100.0 | 142.1 | 100.0 |
| Austria | | 111.0 | 74.5 | 111.4 | 78.4 |

Sources: a: Valeshko et al. (1983), Kostov and Videnov (1985). Table 2 and own calculations.

VII. CONCLUDING REMARKS

We attempted not only to present estimates for levels of economic development in both CPE's and ME's and to discuss related problems in terms of comparability, but to examine also the suitability of the PIG method by identifying the main sources of possible bias at various methods.³⁹ Suggested PIG estimates performed fairly

³⁷ See Valeshko, M., Dyakin, B., Perevertaylo, V., "Spetsyalizatsiya narodnokhosyaystvennykh kompleksov stran-chlenov SEV," *Ekonomicheskoye sotrudnichestvo stran-chlenov SEV*, No. 3, 1983, pp. 63-68.

³⁸ See Kostov, I., Videnov, A., "Mezhdunarodno stoinostno sravnenye s naturalni pokazateli," *Ikonomitscheska Misl*, No. 2, 1985, pp. 46-60.

³⁹ For more details see the forthcoming research report.

well when compared with various alternatives. It has been confirmed that CPE's are generally at lower levels of economic development than the majority of ME's, but not not so much as some would perhaps believe or prefer to see. The gap between both groups of countries remained more or less stable during the last decade or so. This finding—used as a check for the consistency of the officially reported rates of growth—implies that the CPE's official growth rates are unrealistically high in some of these countries by significant margins.

Perhaps some readers may find the comparative GDP's obtained by the PIG method for CPE's too high. The fact is that a certain amount of an upward bias in such estimates cannot be excluded as the PIG method does not take into account the inferiority of most goods and services produced by CPE's compared with developed ME's. A better judgment would however require quality comparisons between countries at a similar level of development. If the quality of products of poorer ME's does not deviate too much from CPE's (or is even lower), the PIG method does not succumb to an upward quality bias for CPE's either. Therefore, we do not consider the bias resulting from the lack of qualitative comparability of some nonmonetary indicators as a serious obstacle to the broader use of the PIG method in future international GDP comparisons.

If we take into account that every comparison of this kind is prone to a certain amount of uncertainty, the relatively modest costs of the PIG method, the possibility to apply this method without close cooperation with CPE's statistical offices, and to apply it to all CPE's uniformly, makes it clearly a preferable approach. The ability of an economy to turn out goods for largely domestic use is measured by per capita GDP and also compared by the proposed PIG based measures of the economic development level. GNP figures do not help to compare the strength of an economy in producing exports competitive on Western markets, and certainly are not useful for comparisons of the quality of life in various countries. The World Bank Atlas per capita GDP of Hungary and Poland, which put these new members of the IMF almost at par with Mongolia, Malaysia, and Mexico are hardly acceptable.

Our assessment (based on PIG estimates for 1980) puts the GDP per capita levels of the GDR (\$7,000) and Czechoslovakia (\$6,600) on par with Italy (\$6,600) and Spain (\$6,400), that of Hungary (\$5,900), the U.S.S.R. (\$5,800), and Bulgaria (\$5,500) slightly higher than Greece (\$5,500) and, finally, that of Poland (\$5,200), Romania (\$4,600), and Yugoslavia (\$4,600) near Portugal (\$4,900) and Argentina (\$5,100).

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EAST EUROPEAN GNP'S, DOMESTIC FINAL USES OF GROSS PRODUCT, RATES OF GROWTH, AND INTERNATIONAL COMPARISONS

By Thad P. Alton*

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I am greatly indebted to all my colleagues at the Research Project on National Income in East Central Europe for their substantive contributions to this paper. Many of the findings outlined here were originally published by various authors in the Project's Occasional Papers. For the current article, special thanks are due to Gregor Lazarcik, Elizabeth M. Bass, Christopher Badach, George J. Staller, Joseph T. Bombelles, and Robert Bakondi. The figures for 1988 in this report reflect provisional estimates based on incomplete or preliminary data.

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SUMMARY

Our independent findings on economic performance, based on adjusted prices, for the seven countries of Eastern Europe—the CMEA six and Yugoslavia—provide a uniform basis for intertemporal comparisons within each country and for international comparisons among the East European countries and the U.S.S.R. and with market-type economies. The official East European measures of economic structure and growth, because of their underlying distorted pricing as compared to factor cost and scarcity pricing, are seriously misleading for analyses of structure and growth even for a single country. In some cases, real performance measures change their valuation bases frequently. Poland, for example, has real linked indexes in prices of 1977, 1982, and 1984. For comparisons within CMEA and with market-type economies, the official East European measures are even more unreliable.

The reader is referred to our list of tables for items of particular interest. Beginning in the 1960's, economic growth in Eastern Europe has slackened steeply, and in the 1980's, growth has been very low compared to earlier periods. Labor productivity has shown declining growth since the 1970's. Because of the poor performance in the 1980's, the lags in relation to what might have been may be viewed as opportunities for rapid catchup in the future. One may surmise, however, that this is not likely to be achieved in the short run because the factors retarding growth are slow in changing.

Success for *perestroika* in Eastern Europe will require prompt and profound systemic changes, price reforms, and an essential address to human motivations that would reprivatize the economies in essence if not in label. The continued monopoly of the Communist parties in setting policy and regulating the economies suggests that it will take more than *glasnost* to induce the populations to strive for more efficient performance with concomitant improvements in the quality and scale of living.

I. INTRODUCTION

In the present paper, detailed findings on economic performance in Eastern Europe, including Yugoslavia, will be presented in tables. Discussion in the text will be directed toward methodology, data sources, and summary findings. The table of contents and list of tables should facilitate locating items of particular interest to the reader. We should stress that our estimates for 1988 are provisional, based on incomplete or preliminary data. Some of the 1987 data in this paper may also be revised as more complete data sources become available.

In our earlier JEC contributions on the economies of Eastern Europe there are detailed expositions of our methodology, sources, and findings.¹ We do not present here extensive detail on measures of performance given in official East European statistical sources based upon the material product system (MPS) of national accounts, with summary indicators of net material product (NMP) national income. Some countries, notably Hungary, Poland, and

¹ See the selected sources for a list with abbreviations and bibliographical detail.

Romania, have, to varying degrees, provided national accounts data in the GNP or GDP coverage and detail recommended by the United Nations Standard National Accounts (SNA) measures. For reasons to be made clear below, we also do not offer these official broader national product measures that include so-called nonmaterial or nonproductive services omitted by the MPS accounts. In brief, the realized current and constant price regimens underlying the official East European measures distort the structures and rates of growth of measures of aggregate performance as compared to findings in approximations to factor cost.

International comparisons of aggregate economic performance face formidable obstacles as regards data availabilities, bases of valuation, and methodology supporting the officially published data. Moreover, international comparisons and intertemporal comparisons for a given country should take into account the attained levels of development in order to provide perspective on the juxtaposed measures. We restrict our intercountry comparisons to the six CMEA countries and Yugoslavia.

Economic growth in Eastern Europe has slackened sharply in recent years; however, the overall growth achieved since 1950 has been impressive by either the MPS measures at official realized prices or by our independent estimates. The important question, however, is, could the performance have been as good, or better, with far less duress than was experienced?

II. BACKGROUND: OVERALL PERFORMANCE MEASURES, 1950-88

Table 1 is of background interest in its juxtapositions of growth rates that are based on differing valuation bases, concepts (MPS versus SNA), and methodologies. Here the coverage of NMP versus "Material GNP" differs essentially by the inclusion of capital consumption allowances in GNP, but not in NMP; the Yugoslav gross social product measure is grosser than NMP by virtue of inclusion of depreciation allowances. What conclusions can one draw from the differences shown by the juxtapositions in Table 1? Assuming that by 1950 Eastern Europe had recovered to significant extent from the effects of World War II, then would the subsequent growth implied by the NMP measures, as surrogates for GNP, fall into the range of the plausible? Consider, for example, the more than twenty fold growth of NMP for Romania, 1950-88, or its corresponding growth of NMP per capita, applied to 1988 dollar estimates of 1988 GNP and deflated by the U.S. GNP implicit price deflator to 1950 prices. Allowing that a part of GNP goes to use other than personal consumption, would the part allocable to the latter be enough to sustain the population?

The result would suggest implausibly low levels of living, to say the least. Using indexes of midyear population and Table 2, herein, such an exercise with respect to plausibility can be easily done for all the countries. Our estimated GNP growth rates based on adjusted factor cost for East European countries appear plausible when taken into account with the shifts of employment away from agriculture to industry and the service sectors.

TABLE 1.—COMPARISON OF GROWTH RATES, 1950–88

[Average annual compound percentage rate]

| | NMP | GNP | Material GNP |
|----------------------|------------------|-----|--------------|
| Bulgaria | 7.6 | 4.3 | 4.7 |
| Czechoslovakia | 4.8 | 3.0 | 3.3 |
| GDR | 5.9 | 3.4 | 4.1 |
| Hungary | 4.5 | 3.0 | 3.3 |
| Poland | 5.2 | 3.4 | 3.6 |
| Romania | 8.3 | 4.8 | 5.4 |
| Yugoslavia | ¹ 4.9 | 4.4 | 4.8 |

¹ Gross social product.

Sources: NMP growth rates are calculated from official statistical yearbooks of the respective countries. GNP growth rates are calculated from Occasional Papers (OP's) of the Research Project on National Income in East Central Europe, from earlier contributions by the author to JEC Compendiums on the economies of Eastern Europe, and other Project estimates. Rates are obtained as compound rates between endpoint indexes.

Table 2 presents juxtapositions of NMP and GNP indexes, 1950–88, and corresponding annual growth rates by 5-year intervals plus annual changes for 1986–88. There are the very substantial declines in rates of growth by both the GNP and NMP measures. An overall leveling off occurred over 1960–75, except for the sharp downturn, 1960–65, for Czechoslovakia, and exceptional growth, 1970–75, for Poland. From 1975 onward, there are steep declines in rates of growth, and good reasons for the more evident concern for economic reforms. Popular expectations for substantial increases in the quality and level of living were not being realized. For a few years, notably 1970–75, Western loans to Poland and Romania, among others, dampened the declining tendencies. Subsequently, however, the systemic disadvantages of the centrally planned economies (CPE's), coupled with debt burdens, led to lower growth rates. The small economies of Eastern Europe, because of their need to rely heavily on foreign trade, feel the adversities more keenly than the U.S.S.R., very probably because their pre-CPE experience is not so remote as in the U.S.S.R.

TABLE 2.—INDEXES AND ANNUAL GROWTH RATES OF GNP AND NMP PRODUCED, 1950–88

[Indexes: 1950=100; annual growth rates in percent]

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia | Eastern Europe |
|--------------------------------|----------|----------------|-------|---------|--------|---------|------------|----------------|
| GNP Indexes: | | | | | | | | |
| 1950 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1985 | 460.9 | 299.0 | 342.9 | 297.6 | 346.6 | 536.2 | 498.5 | 371.0 |
| 1986 | 483.2 | 305.3 | 347.9 | 304.2 | 356.0 | 567.2 | 517.5 | 382.3 |
| 1987 | 479.5 | 308.3 | 354.0 | 307.3 | 349.9 | 573.3 | 515.0 | 382.8 |
| 1988 ² | 488.3 | 312.6 | 360.4 | 310.7 | 356.7 | 585.4 | 515.7 | 388.7 |
| NMP Indexes: | | | | | | | | |
| 1950 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1985 | 1,395.4 | 550.3 | 797.0 | 497.0 | 607.8 | 1,799.0 | 622.3 | 622.3 |
| 1986 | 1,469.7 | 564.4 | 831.0 | 501.0 | 637.7 | 1,929.5 | 644.5 | 644.5 |
| 1987 | 1,544.8 | 576.7 | 861.0 | 522.0 | 650.4 | 2,023.7 | 637.7 | 637.7 |
| 1988 ² | 1,640.6 | 594.0 | 886.8 | 524.6 | 681.3 | 2,088.4 | 624.9 | 624.9 |
| GNP growth rates: ¹ | | | | | | | | |
| 1950–55 | 5.0 | 3.0 | 6.4 | 4.7 | 4.6 | 7.2 | 4.3 | 5.1 |
| 1955–60 | 7.8 | 6.3 | 5.0 | 4.6 | 4.5 | 4.4 | 8.0 | 5.3 |
| 1960–65 | 6.5 | 2.0 | 2.9 | 4.3 | 4.1 | 5.2 | 6.3 | 4.0 |
| 1965–70 | 4.7 | 3.5 | 3.2 | 3.1 | 3.8 | 4.6 | 4.2 | 3.8 |
| 1970–75 | 4.5 | 3.4 | 3.5 | 3.4 | 6.6 | 6.2 | 4.6 | 4.8 |
| 1975–80 | 1.2 | 2.2 | 2.4 | 2.3 | 0.9 | 3.9 | 5.8 | 2.5 |

TABLE 2.—INDEXES AND ANNUAL GROWTH RATES OF GNP AND NMP PRODUCED, 1950–88—
Continued

(Indexes: 1950 = 100; annual growth rates in percent)

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia | Eastern Europe |
|--------------------------------|----------|----------------|------|---------|--------|---------|------------|----------------|
| 1980–85..... | 0.9 | 1.4 | 1.8 | 0.9 | 1.2 | 2.0 | 1.3 | 1.4 |
| 1986..... | 4.8 | 2.1 | 1.5 | 2.2 | 2.7 | 5.8 | 3.8 | 3.0 |
| 1987..... | -0.8 | 1.0 | 1.8 | 1.0 | -1.7 | 1.1 | -0.5 | 0.1 |
| 1988 ² | 1.8 | 1.4 | 1.8 | 1.1 | 1.9 | 2.1 | 0.1 | 1.5 |
| NMP growth rates: ¹ | | | | | | | | |
| 1950–55..... | 10.8 | 7.7 | 12.2 | 4.8 | 8.8 | 11.9 | 4.3 | ..... |
| 1955–60..... | 10.6 | 7.1 | 7.8 | 7.4 | 6.7 | 7.8 | 8.9 | ..... |
| 1960–65..... | 7.0 | 1.3 | 3.5 | 4.4 | 5.9 | 8.9 | 7.5 | ..... |
| 1965–70..... | 8.6 | 6.8 | 5.3 | 6.8 | 6.0 | 7.6 | 5.5 | ..... |
| 1970–75..... | 7.8 | 5.7 | 5.5 | 6.3 | 10.0 | 11.1 | 5.9 | ..... |
| 1975–80..... | 6.1 | 3.7 | 4.2 | 3.2 | 1.4 | 7.3 | 6.1 | ..... |
| 1980–85..... | 3.7 | 1.9 | 4.5 | 1.3 | 0.1 | 4.5 | 0.6 | ..... |
| 1986..... | 5.3 | 2.5 | 4.3 | 0.8 | 4.9 | 7.3 | 3.6 | ..... |
| 1987..... | 5.1 | 2.2 | 3.6 | 4.2 | 2.0 | 4.9 | -1.1 | ..... |
| 1988 ² | 6.2 | 3.0 | 3.0 | 0.5 | 4.8 | 3.2 | -2.0 | ..... |

¹ Five-year rates are calculated by least squares fit to annual observations except for GNP for the GDR, Romania, Yugoslavia, and Eastern Europe, 1950–1960, which are calculated as compound rates between endpoints. The formula for all calculations was $I_m = I_0 (1 + R)^n$. Rates for GNP in 1986–1988 are calculated from unrounded indexes underlying OP-105, not from rounded linked indexes shown here.

² 1988 data are provisional, based on available incomplete or preliminary data.

Sources: GNP: Project indexes, 1950–1960, JEC 1970, p. 61; 1960–1965, JEC 1974, p. 270; 1965–1970, OP-89; 1975–1987, OP-105 (draft). NMP: Statistical yearbooks and plan fulfillment reports of the respective countries.

Tables 3 and 4 provide annual detail for overall GNP performance, 1970 and 1975–88. On a per capita basis, 1975=100, Table 4 shows strikingly Poland's fall from rapid growth to actual negative growth; by 1987, the level was about 3 percent below 1975. The relatively poor recent performance in Eastern Europe provided the background for the current ferment of discussion of and measures for economic reform.

TABLE 3.—EASTERN EUROPE: INDEXES OF REAL GNP AT ADJUSTED FACTOR COST, 1970 AND 1975–88

(Indexes 1975 = 100)

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia |
|-------------------------|----------|----------------|-------|---------|--------|---------|------------|
| 1970..... | 79.6 | 84.8 | 84.4 | 85.0 | 73.0 | 72.3 | 80.0 |
| 1975..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1976..... | 103.0 | 101.8 | 102.0 | 100.3 | 102.5 | 110.7 | 103.1 |
| 1977..... | 102.0 | 106.2 | 105.1 | 106.6 | 104.4 | 113.6 | 110.6 |
| 1978..... | 104.2 | 107.9 | 106.9 | 109.2 | 108.2 | 118.9 | 116.7 |
| 1979..... | 108.2 | 108.8 | 109.9 | 109.4 | 106.2 | 123.2 | 124.7 |
| 1980..... | 105.1 | 111.4 | 112.2 | 110.5 | 103.6 | 121.3 | 130.7 |
| 1981..... | 107.9 | 110.9 | 114.5 | 111.3 | 98.0 | 121.6 | 132.8 |
| 1982..... | 111.4 | 113.0 | 114.1 | 115.3 | 97.1 | 124.0 | 134.0 |
| 1983..... | 109.3 | 114.7 | 116.3 | 114.1 | 101.9 | 124.1 | 135.2 |
| 1984..... | 112.9 | 117.5 | 119.6 | 117.1 | 105.7 | 131.5 | 138.5 |
| 1985..... | 109.5 | 118.3 | 123.3 | 114.2 | 106.7 | 133.2 | 139.3 |
| 1986..... | 114.8 | 120.8 | 125.1 | 116.7 | 109.6 | 140.9 | 144.6 |
| 1987..... | 113.9 | 122.0 | 127.3 | 117.9 | 107.7 | 142.4 | 143.9 |
| 1988 [*] | 116.0 | 123.7 | 129.6 | 119.2 | 109.8 | 145.4 | 144.1 |

^{*} 1988 data are provisional, based on incomplete or preliminary data.

Source: OP-105 (draft).

TABLE 4.—EASTERN EUROPE: INDEXES OF REAL GNP PER CAPITA AT ADJUSTED FACTOR COST, 1970 AND 1975-88

(Indexes 1975 = 100)

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia |
|-------------|----------|----------------|-------|---------|--------|---------|------------|
| 1970..... | 81.1 | 87.5 | 83.4 | 86.6 | 76.4 | 75.9 | 83.9 |
| 1975..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1976..... | 102.6 | 101.0 | 102.4 | 99.8 | 101.5 | 109.7 | 102.1 |
| 1977..... | 101.0 | 104.6 | 105.6 | 105.5 | 102.4 | 111.4 | 108.5 |
| 1978..... | 103.1 | 105.5 | 107.7 | 107.5 | 105.1 | 115.6 | 113.5 |
| 1979..... | 106.9 | 105.7 | 110.6 | 107.7 | 102.5 | 118.7 | 120.2 |
| 1980..... | 103.4 | 107.7 | 113.0 | 108.7 | 99.1 | 116.1 | 125.2 |
| 1981..... | 105.8 | 107.2 | 115.3 | 109.4 | 92.9 | 115.6 | 126.3 |
| 1982..... | 108.9 | 108.8 | 115.1 | 113.4 | 91.2 | 117.2 | 126.4 |
| 1983..... | 106.6 | 110.1 | 117.4 | 112.4 | 94.8 | 116.9 | 126.7 |
| 1984..... | 109.9 | 112.5 | 120.9 | 115.6 | 97.4 | 123.5 | 128.8 |
| 1985..... | 106.6 | 113.0 | 124.8 | 113.0 | 97.6 | 124.5 | 128.7 |
| 1986..... | 111.8 | 115.1 | 126.8 | 115.6 | 99.6 | 131.2 | 132.7 |
| 1987..... | 110.7 | 116.0 | 128.9 | 117.0 | 97.3 | 131.9 | 131.3 |
| 1988 *..... | 103.0 | 108.4 | 98.0 | 104.1 | 101.2 | 126.3 | 130.7 |

* 1988 data are provisional, based on available incomplete or preliminary data.

Source: OP-105 (draft) and official data on midyear population.

III. ECONOMIC PERFORMANCE MEASURES, 1970 AND 1975-88

We provide here the rationale for our independent measures of East European economic performance, comments on methodology to give perspective on our estimates, and detailed sectoral indexes of GNP and domestic final uses of gross product.

THE NEED FOR INDEPENDENT ESTIMATES

Central planning in a socialized economy has been widely discussed, with views ranging from condemnation of socialism as a renunciation of rational economy to theoretical defenses of socialism as a feasible alternative to a competitive free market economy. A critical point was the feasibility of a socialist economy to emulate a competitive capitalist economy in setting prices so that an optimum of resource allocation and consumer sovereignty could be achieved. The dangers of state bureaucratic intervention in economic decisionmaking were recognized early in the discussions.

Pioneering work was done by Abram Bergson in making adjustments to Soviet prices in estimating the structure and growth of the Soviet economy.² Bergson's "adjusted factor cost standard" is the starting point for weighting regimens in our independent estimates for Eastern Europe.

Observers in Eastern Europe recognize that official measures of aggregate economic performance distort the structural composition and rates of growth of national product. We have discussed in our earlier JEC contributions recalculations of Polish NMP produced and distributed at prices approximating factor cost, carried out in

² Abram Bergson, *Soviet National Income and Product in 1937* (Columbia University Press, New York, 1953); Abram Bergson and Hans Heymann, Jr., *Soviet National Income and Product, 1940-1948* (Columbia University Press, New York, 1954); Abram Bergson, *The Real National Income of Soviet Russia since 1928* (Harvard University Press, Cambridge, 1961).

the Polish Central Statistical Office.³ We may state here only briefly the consistent conclusions reached by the Polish economists. In an article in the official journal of the Polish Central Statistical Office, Leszek Zienkowski, a leading economist and an expert in the field of national income, states, "In conclusion, I would like to call attention to the significance that the accepted system of constant prices has for the calculations of real growth measures of various economic categories. In Polish statistical practice, one takes as the system of constant prices the existing system of realized prices in the specified year (lately one applies the prices of 1977 as constant prices). Perhaps it is not necessary to argue that the relative realized prices do not correspond in our conditions either to relations of outlays of socially essential labor, or to demand and supply relations. They represent, therefore, economic structure in a 'crooked mirror'. This 'crooked mirror' deforms not only structure, but also rates of growth." He recommends "... regular estimates of real growth of national income in synthetic prices. After a price reform is carried out as part of an overall economic reform, the differences may surely be smaller than at present, but the problem is nevertheless so important that regular calculations in both systems of prices are without doubt worth carrying out."⁴

Perestroika so far has not induced essential price reforms in Eastern Europe. Inflation is serious in Yugoslavia, Poland, and Hungary. Pricing is still a matter of social policy, especially for consumer necessities, and subsidies comprise a very large percentage of total state budget expenditures. In Poland, in 1975, as percentages of total expenditures, current subsidies, excluding investment, accounted for 42.5, and including investment, 59.7; in 1985, the corresponding figures were 39.2 and 53.7.⁵ In Hungary, as percentages of total state budget outlays, in 1970, subsidies (excluding investment) to state-owned enterprises and cooperatives and budgetary "economic activities" were 33.5, and "other" expenditure, 8.0; in 1975, the corresponding figures were 37.6 and 7.9; in 1985 (again, as percentages of total state budget expenditures), subsidies to "economic organizations" and budgetary "economic activities" were 26.0, consumer price support, 7.8, and "international and other" expenditures, 9.0; in 1987, the corresponding figures, respectively to 1985, were 25.8, 8.4, and 10.6.⁶

Because the scope of state budget expenditures may have changed over time, the percentages given above are not as clearly defined as they might be with regard to national income. In the case of Hungary, the ratios of the current subsidies as percentages of officially given current values of NMP and GDP were as follows: 1970—21.4 and 17.7, 1975—29.5 and 24.4, 1985—19.4 and 16.3, and 1987—24.7 and 22.2.⁷ The presence of such large subsidies suggests

³ See the selected sources for a list of our earlier JEC contributions.

⁴ Leszek Zienkowski, "Ceny—pieta achillesowa statystyki" [Prices—the Achilles Heel of Statistics], *Wiadomosci statystyczne*, 1982, No. 1, p. 4.

⁵ Poland, Central Statistical Office, *Rocznik statystyczny finansow* [Statistical Yearbook of Finances], 1982, pp. 17, 20, and *ibid.*, 1986, pp. 21, 25.

⁶ Hungary, *Statistikai evkonyv* [Statistical Yearbook], 1976, p. 64, *ibid.*, 1986, p. 330; and *ibid.*, 1987, p. 347.

⁷ Sources for the NMP and GDP are the statistical yearbooks, national income sections.

that price reforms still have a long way to go. In 1987, Hungarian retail prices, as percentages of producer prices, were 69 for natural gas, 63 for heating oil, 55 for coke, 49 for briquettes imported from the GDR, 44 for day use of electricity, 32 for night use of electricity, 27 for domestic briquettes, and 26 for domestic coal.⁸

METHODOLOGY OF INDEPENDENT ESTIMATES

Our measures depend on adjusted factor cost weights for base years derived on the assumption that the GNP can be fully resolved into charges for factors of production, and that these sectoral weights can be moved over time by indexes based essentially on physical series aggregated to product group, branch, and sectoral levels by approximations of factor cost weights. Detailed descriptions of our GNP weights are given in our *Occasional Papers (OP's)*, Nos. 48 and 64. Corresponding descriptions of our weights for domestic final uses of gross product are given in *OP's*, Nos. 61 and 64, as supplemented in Nos. 55, 57, and 58. The indexes that apply to the respective weights are also provided in our *OP* series.

Our total of domestic final uses of gross product is defined as domestic private and government consumption plus domestic gross investment. This total is derived in domestic values as GNP originated at adjusted factor cost augmented by the value of net imports, or diminished by the value of net exports, year by year. Up to 1975, our GNP and final use measures reflect weights drawn from the late 1960's; for the 1975-88 period, the weights are taken from the mid-1970's. The segments in the corresponding weights are linked at 1975.

Our domestic final use weights are in part based on factor cost of GNP by origin and in part on realized market prices in the base year. The total of the uses is, as noted, very close to factor cost because the foreign trade balance is a relatively small adjustment. The indexes for housing and selected components of government services are the same by use as by origin, however, their final use weights reflect purchases at market prices to augment the value added in GNP by origin. Personal consumption, the major component in the total of domestic final uses, is market price weighted, and the indexes moving personal consumption components are calculated from data on physical quantities of goods and services bought by the population from their own incomes or consumed as income in kind in agriculture. For most countries, the necessary data for most categories of consumption were reasonably complete in coverage.

Our findings as to the relative structure of domestic final uses of gross product as reflective of factor costs must to some extent remain conjectural, for indeed the weights are hybrids of factor cost and market prices, although the total of final uses is close to adjusted factor cost. A major final use category in our tables is labeled simply as a residual comprising gross investment, defense expenditures, government services not explicitly indicated, and statistical discrepancies. Being a residual, this category has no directly

⁸ Arpad Hajnoczy, "Felfutott piac [Overheated Market]," *Figyelo*, Nov. 10, 1988.

derived weight, and its index is based on the value residuals in the defined value totals of final uses year by year.

Polish official calculations of NMP distributed expressed as percentage shares for consumption and investment components in realized prices and in variants of synthetic prices (*ceny umowne*) approximating factor cost show closely similar structure. Evidently, the price distortions caused by turnover taxes, profit levies, and subsidies are mutually offsetting at the level of the major components of domestic final uses in gross national income (NMP plus depreciation), that is, for total consumption, consumption by the population from personal incomes, gross investment, investment in fixed capital, and changes in working capital and reserves.⁹

Some tests we have made to see if the residual category in our estimates of final uses would accommodate official value series for investment and defense have shown positive outcomes; the residuals had some small extra capacity for other, not specified, uses and statistical discrepancy. An interesting question remains unanswered: what is the share of military expenditure within our residual category?

Attempts to disaggregate the residual series by using official data on military expenditures and gross investment would have to take into account statements by some East European national statistical offices that military hardware procurements enter the category of accumulation (investment), whereas other parts of military expenditures are categorized as personal consumption and collective, or social, consumption. Matkowski outlines the material national income conventions followed in socialist countries;¹⁰ his statements concur with methodological comments of some East European central statistical offices.

As regards national income distributed, he states that among the component categories are consumption by the population of goods and material services bought from their personal incomes or produced on farms and consumed in kind and "other consumption equal to (1) consumption by the population of goods and material services supplied free, and (2) consumption of goods and material services in economic units in the nonproductive sphere, including national defense . . .". Further, he explains that in the material product system (MPS) of national accounting applied in socialist countries, "direct expenditures on national defense are included in various categories of national income distributed, depending on their purpose: personal expenditures enter the fund of individual consumption, material expenditures—depending on their character—are shown in other (in broad sense—collective) consumption or in the accumulation fund (investment and increase in working capital and reserves)." Comparing the MPS and SNA systems of national accounting, he states: "Let us observe that direct (i.e., includ-

⁹ Poland, Central Statistical Office, *Rocznik Dochodu Narodowego*, 1971 (Yearbook of National Income, 1971), "Appendix, National Income in Synthetic Prices," p. 214 ff; M. Antolak and A. Bocian, "Proportions in the Creation and Use of National Income; A Study in Actual Prices," *Wiadomosci Statystyczne*, a publication of the Central Statistical Office, November 1976, pp. 1-5; and by the same authors, "National Income and Consumption in 1971-75; A Study in Actual and Synthetic Prices," *Wiadomosci Statystyczne*, March 1979, pp. 7-11.

¹⁰ Matkowski, "Competitiveness of Military and Civilian Demands and Shifts in the Distribution of National Income," *Ekonomista*, 1982, Nos. 5 and 6, pp. 576-577.

ed in the military budget) expenditures on investment for military purposes are treated in one system as a component of investment, in the other—as a component of public consumption. Independently of this, in both systems the total of investment shown in national income statistics includes a component of outlays of a military or civilian-military purpose outside the official defense budget, which is not susceptible of isolation and difficult to estimate.”

In this context, we have the information given by Marshal Sergei F. Akhromeyev, Chief of the Soviet General Staff and one of three top deputies to the Defense Minister. He stated, “For instance, the defense budget that we make public (to the tune of 20.2 billion rubles) serves to reflect the Soviet ministry of defense spending on military personnel, logistics, combat training, pensions, and several other items. Funds for arms procurement are appropriated under other items of the Soviet Union’s state budget.”¹¹

If military procurements enter the investment category of national accounts in Eastern Europe, then some caution should be observed by analysts using such data. Because of the difficulties of quantification, we have left our component of residual domestic final uses of gross product without specification of outlays on defense, fixed investment excluding defense, other government expenditures, inventory changes, and an eventual residual comprising all else and statistical discrepancies.

IV. COMPARATIVE PERFORMANCE MEASURES

Table 5 presents our estimates of real GNP growth, 1970–87, at adjusted factor cost uniformly applied to the seven countries of Eastern Europe. We leave it to the reader to consider the relative performance among the seven countries. We should note here that the basic statistics underlying these tables vary in quality and amplitude among the countries. The basic data are better for Poland and Hungary than for Bulgaria and Romania (which is at the bottom in this regard); the data for Czechoslovakia are better than those for the GDR, and these two countries would rank in the middle range. The 1988 data are provisional, based on incomplete or preliminary data.

TABLE 5.—EASTERN EUROPE: INDEXES OF REAL GNP BY SECTOR OF ORIGIN, 1970, 1975, AND 1980–88

(Indexes 1975 = 100)

| | Weights (per- cent) | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 * |
|-----------------------------------|---------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| BULGARIA (1975) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 79.6 | 100.0 | 105.1 | 107.9 | 111.4 | 109.3 | 112.9 | 109.5 | 114.8 | 113.9 | 116.0 |
| Industry..... | 35.06 | 75.7 | 100.0 | 118.0 | 120.8 | 124.4 | 126.6 | 129.1 | 129.3 | 131.5 | 133.3 | 135.6 |
| Agriculture and forestry | 27.64 | 90.1 | 100.0 | 84.1 | 88.0 | 92.8 | 81.5 | 89.3 | 75.5 | 88.7 | 79.6 | 80.0 |
| Construction | 6.68 | 87.0 | 100.0 | 106.1 | 105.9 | 109.4 | 108.7 | 109.1 | 106.5 | 110.3 | 111.9 | 111.9 |
| Transport and communications..... | 8.13 | 68.5 | 100.0 | 118.1 | 123.8 | 123.0 | 124.9 | 127.1 | 126.1 | 126.4 | 129.2 | 136.1 |
| Trade..... | 7.18 | 68.8 | 100.0 | 106.2 | 107.9 | 113.7 | 113.5 | 115.1 | 118.0 | 123.2 | 127.9 | 132.2 |

¹¹ Official translation, as reported in *The New York Times*, Oct. 30, 1987, excerpts from an interview on Oct. 27, 1987, and in response to written questions.

TABLE 5.—EASTERN EUROPE: INDEXES OF REAL GNP BY SECTOR OF ORIGIN, 1970, 1975, AND 1980-88—Continued

| | Weights (per- cent) | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 * |
|--|---------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Housing..... | 4.44 | 82.5 | 100.0 | 113.1 | 115.8 | 118.5 | 121.2 | 124.0 | 126.6 | 129.4 | 132.1 | 134.8 |
| Government and other services..... | 10.87 | 79.7 | 100.0 | 102.1 | 103.5 | 104.5 | 105.7 | 106.8 | 108.9 | 109.5 | 111.6 | 113.6 |
| CZECHOSLOVAKIA (1977) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 84.8 | 100.0 | 111.4 | 110.9 | 113.0 | 114.7 | 117.5 | 118.3 | 120.8 | 122.0 | 123.7 |
| Industry..... | 38.6 | 82.7 | 100.0 | 115.0 | 117.2 | 118.7 | 120.9 | 122.6 | 124.9 | 127.6 | 129.5 | 131.1 |
| Agriculture and forestry..... | 16.9 | 89.1 | 100.0 | 107.9 | 97.4 | 107.0 | 108.8 | 118.0 | 113.5 | 117.3 | 116.5 | 119.7 |
| Construction..... | 8.9 | 82.5 | 100.0 | 108.0 | 107.9 | 104.8 | 104.3 | 103.9 | 103.5 | 104.6 | 105.0 | 104.5 |
| Transport and communications..... | 7.9 | 83.2 | 100.0 | 116.7 | 117.9 | 119.0 | 120.3 | 122.7 | 125.4 | 128.5 | 129.7 | 131.5 |
| Trade..... | 8.9 | 76.3 | 100.0 | 107.4 | 107.5 | 107.5 | 109.6 | 111.8 | 113.7 | 115.5 | 117.7 | 119.9 |
| Housing..... | 9.4 | 92.7 | 100.0 | 107.2 | 108.4 | 109.5 | 110.6 | 111.7 | 112.9 | 113.8 | 114.6 | 115.5 |
| Government and other services..... | 9.5 | 90.8 | 100.0 | 110.4 | 111.9 | 113.0 | 114.5 | 116.3 | 118.4 | 120.9 | 122.9 | 124.6 |
| GERMAN DEMOCRATIC REPUBLIC (1975) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 84.4 | 100.0 | 112.2 | 114.5 | 114.1 | 116.3 | 119.6 | 123.3 | 125.1 | 127.3 | 129.6 |
| Industry..... | 42.82 | 84.7 | 100.0 | 115.7 | 119.2 | 119.6 | 121.5 | 125.0 | 129.7 | 132.7 | 135.5 | 139.2 |
| Agriculture and forestry..... | 14.63 | 87.0 | 100.0 | 104.4 | 107.2 | 106.1 | 110.9 | 120.0 | 125.1 | 123.6 | 123.5 | 121.7 |
| Construction..... | 5.24 | 79.5 | 100.0 | 114.2 | 111.7 | 110.5 | 110.9 | 113.5 | 114.9 | 115.4 | 117.1 | 119.0 |
| Transport and communications..... | 8.19 | 77.2 | 100.0 | 112.4 | 111.4 | 103.5 | 104.2 | 105.4 | 108.4 | 111.3 | 115.0 | 118.1 |
| Trade..... | 8.51 | 78.1 | 100.0 | 111.2 | 112.7 | 111.0 | 113.0 | 114.5 | 118.5 | 120.2 | 123.1 | 126.3 |
| Housing..... | 8.76 | 94.6 | 100.0 | 104.2 | 105.1 | 106.0 | 106.9 | 107.9 | 108.8 | 109.6 | 110.5 | 111.3 |
| Government and other services..... | 11.85 | 87.4 | 100.0 | 115.2 | 118.4 | 120.9 | 124.1 | 124.4 | 126.0 | 128.0 | 130.6 | 133.4 |
| HUNGARY (1976) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 85.0 | 100.0 | 110.5 | 111.3 | 115.3 | 114.1 | 117.1 | 114.2 | 116.7 | 117.9 | 119.2 |
| Industry..... | 32.37 | 87.9 | 100.0 | 111.6 | 113.3 | 114.7 | 115.8 | 119.1 | 119.2 | 120.3 | 123.9 | 124.7 |
| Agriculture and forestry..... | 23.88 | 82.6 | 100.0 | 108.3 | 107.6 | 121.1 | 114.3 | 121.4 | 111.2 | 115.7 | 110.7 | 114.8 |
| Construction..... | 7.53 | 84.6 | 100.0 | 102.4 | 99.4 | 96.7 | 96.6 | 93.2 | 83.9 | 85.2 | 88.2 | 86.2 |
| Transport and communications..... | 8.25 | 85.3 | 100.0 | 121.3 | 124.1 | 123.5 | 123.2 | 124.2 | 123.5 | 125.9 | 128.9 | 133.5 |
| Trade..... | 7.04 | 73.3 | 100.0 | 110.6 | 113.4 | 114.7 | 113.6 | 113.4 | 113.9 | 117.2 | 123.9 | 119.1 |
| Housing..... | 10.63 | 90.7 | 100.0 | 110.0 | 111.8 | 113.6 | 114.5 | 115.4 | 117.3 | 118.6 | 120.3 | 121.6 |
| Government and other services..... | 10.30 | 85.4 | 100.0 | 110.2 | 111.3 | 112.2 | 114.5 | 116.0 | 118.2 | 121.5 | 123.7 | 123.9 |
| POLAND (1977) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 73.0 | 100.0 | 103.6 | 98.0 | 97.1 | 101.9 | 105.7 | 106.7 | 109.6 | 107.7 | 109.8 |
| Industry..... | 33.92 | 69.4 | 100.0 | 102.9 | 89.7 | 87.3 | 92.8 | 96.0 | 97.4 | 98.1 | 97.4 | 101.3 |
| Agriculture and forestry..... | 26.24 | 94.4 | 100.0 | 95.1 | 99.1 | 103.7 | 108.7 | 113.9 | 114.2 | 120.8 | 112.0 | 111.3 |
| Construction..... | 7.22 | 58.6 | 100.0 | 94.9 | 80.0 | 71.4 | 75.9 | 77.0 | 75.0 | 77.1 | 78.1 | 78.5 |
| Transport and communications..... | 7.91 | 55.1 | 100.0 | 121.0 | 105.2 | 98.5 | 103.6 | 109.6 | 109.4 | 112.3 | 113.5 | 119.1 |
| Trade..... | 6.26 | 63.6 | 100.0 | 107.8 | 102.0 | 92.8 | 99.4 | 102.7 | 105.7 | 106.5 | 110.4 | 113.1 |
| Housing..... | 8.61 | 87.3 | 100.0 | 114.4 | 116.9 | 119.1 | 121.4 | 124.1 | 126.8 | 129.4 | 132.1 | 134.1 |
| Government and other services..... | 9.84 | 81.8 | 100.0 | 110.0 | 112.8 | 114.1 | 117.0 | 120.8 | 123.2 | 125.1 | 126.0 | 127.5 |
| ROMANIA (1977) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 72.3 | 100.0 | 121.3 | 121.6 | 124.0 | 124.1 | 131.5 | 133.2 | 140.9 | 142.4 | 145.4 |
| Industry..... | 38.14 | 64.5 | 100.0 | 124.2 | 124.6 | 125.7 | 128.7 | 135.6 | 137.9 | 144.4 | 144.0 | 145.9 |
| Agriculture and forestry..... | 27.90 | 77.2 | 100.0 | 116.7 | 116.9 | 126.5 | 126.0 | 140.4 | 144.6 | 161.1 | 166.8 | 173.6 |
| Construction..... | 7.23 | 87.7 | 100.0 | 123.2 | 116.4 | 117.9 | 111.1 | 116.9 | 110.1 | 113.5 | 109.5 | 111.9 |
| Transport and communications..... | 6.26 | 64.4 | 100.0 | 121.7 | 122.7 | 117.9 | 109.5 | 110.4 | 106.5 | 112.5 | 112.7 | 115.1 |
| Trade..... | 7.47 | 67.4 | 100.0 | 138.0 | 139.6 | 133.2 | 131.9 | 137.2 | 139.3 | 142.6 | 146.4 | 147.1 |
| Housing..... | 3.83 | 89.2 | 100.0 | 112.5 | 115.3 | 117.7 | 120.0 | 122.0 | 123.6 | 124.9 | 126.4 | 127.7 |
| Government and other services..... | 9.17 | 89.7 | 100.0 | 111.3 | 113.7 | 115.4 | 116.4 | 117.0 | 118.7 | 118.9 | 119.7 | 120.6 |

TABLE 5.—EASTERN EUROPE: INDEXES OF REAL GNP BY SECTOR OF ORIGIN, 1970, 1975, AND 1980-88—Continued

(Indexes 1975 = 100)

| | Weights (per- cent) | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 * |
|------------------------------------|---------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| YUGOSLAVIA (1975) | | | | | | | | | | | | |
| Gross National Product..... | 100.00 | 80.0 | 100.0 | 130.7 | 132.8 | 134.0 | 135.2 | 138.5 | 139.3 | 144.6 | 143.9 | 144.1 |
| Industry..... | 29.74 | 75.7 | 100.0 | 141.4 | 143.7 | 141.6 | 144.9 | 149.3 | 151.4 | 156.8 | 157.6 | 158.6 |
| Agriculture and forestry..... | 18.83 | 87.0 | 100.0 | 112.5 | 115.7 | 123.9 | 123.1 | 125.8 | 117.2 | 129.7 | 124.1 | 123.3 |
| Construction..... | 6.76 | 73.5 | 100.0 | 162.9 | 156.0 | 148.6 | 137.2 | 137.6 | 139.0 | 139.1 | 139.8 | 128.0 |
| Transport and communications..... | 7.87 | 75.5 | 100.0 | 131.7 | 133.5 | 134.5 | 139.6 | 149.4 | 156.2 | 161.8 | 168.6 | 175.7 |
| Trade..... | 10.08 | 78.1 | 100.0 | 122.2 | 124.5 | 124.4 | 125.7 | 124.6 | 125.4 | 127.3 | 119.5 | 114.2 |
| Housing..... | 9.58 | 81.9 | 100.0 | 122.1 | 125.4 | 128.6 | 131.8 | 134.9 | 137.8 | 140.7 | 143.5 | 145.7 |
| Government and other services..... | 17.13 | 85.3 | 100.0 | 127.1 | 130.6 | 133.5 | 135.7 | 138.8 | 143.3 | 146.4 | 150.1 | 150.8 |

* 1988 date are provisional, based on incomplete or preliminary data.

Sources: Indexes: OP-105 (draft). Weights: These are mid-1970s weights as indicated in OP-105. 1970 sectoral indexes for Eastern Europe were aggregated with late 1960s weights and linked at 1975=100; Yugoslavia, 1970-1988, is aggregated with 1976 weights. See OP-105 for details.

Table 6 presents indexes of domestic final uses of gross product in constant prices. The relatively small sectors of housing and selected government services (administration, education and culture, and health and social welfare) show stability of growth, which is to be expected since housing stock reflected in the housing index is not volatile, and government services indexes are based on employment. The interesting sectors are "personal consumption excluding housing" and the "residual" comprising gross investment, defense, and other uses. Government policy to appease expectations of the population, to service the burden of foreign debt, and to participate in foreign trade is reflected in the tradeoffs between these two major sectors.

TABLE 6.—EASTERN EUROPE: INDEXES OF REAL DOMESTIC FINAL USES OF GROSS PRODUCT AT ADJUSTED MARKET PRICES, 1970, 1975, AND 1980-88

(Indexes 1975 = 100)

| | Weights percent | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 * |
|---|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| BULGARIA (1975) | | | | | | | | | | | | |
| Private consumption..... | 51.29 | 82.9 | 100.0 | 108.3 | 110.6 | 115.4 | 115.5 | 118.1 | 119.7 | 124.1 | 126.0 | 129.3 |
| Personal consumption exclud- ing housing..... | 45.98 | 83.00 | 100.0 | 107.8 | 110.0 | 115.0 | 114.8 | 117.4 | 118.9 | 123.5 | 125.3 | 128.7 |
| Housing..... | 5.31 | 82.5 | 100.0 | 113.1 | 115.8 | 118.5 | 121.2 | 124.0 | 126.6 | 129.4 | 132.1 | 134.8 |
| Government, selected elements..... | 9.83 | 77.3 | 100.0 | 111.1 | 113.3 | 114.3 | 114.9 | 116.2 | 117.4 | 118.8 | 120.3 | 120.6 |
| Residual: gross investment, defense, other..... | 38.88 | 69.0 | 100.0 | 65.2 | 74.0 | 69.9 | 59.6 | 64.8 | 55.0 | 68.8 | 49.1 | 44.2 |
| Gross product distributed to domes- tic final use..... | 100.00 | 77.0 | 100.0 | 91.9 | 96.6 | 97.6 | 93.7 | 97.2 | 94.3 | 102.1 | 95.6 | 95.4 |
| CZECHOSLOVAKIA (1977) | | | | | | | | | | | | |
| Private consumption..... | 56.83 | 87.7 | 100.0 | 107.9 | 108.4 | 109.7 | 111.5 | 112.8 | 115.0 | 116.9 | 119.4 | 121.6 |
| Personal consumption exclud- ing housing..... | 46.36 | 86.6 | 100.0 | 108.1 | 108.4 | 109.8 | 111.7 | 113.1 | 115.5 | 117.6 | 120.5 | 123.0 |
| Housing..... | 10.47 | 92.7 | 100.0 | 107.2 | 108.4 | 109.5 | 110.6 | 111.7 | 112.9 | 113.8 | 114.6 | 115.5 |
| Government, selected elements..... | 9.42 | 86.0 | 100.0 | 113.2 | 117.2 | 118.5 | 119.7 | 121.7 | 123.7 | 125.9 | 127.3 | 128.7 |
| Residual: gross investment, defense, other..... | 33.75 | 77.3 | 100.0 | 106.6 | 95.1 | 94.3 | 91.7 | 91.0 | 88.6 | 106.6 | 110.8 | 111.7 |

TABLE 6.—EASTERN EUROPE: INDEXES OF REAL DOMESTIC FINAL USES OF GROSS PRODUCT AT ADJUSTED MARKET PRICES, 1970, 1975, AND 1980–88—Continued

(Indexes 1975 = 100)

| | Weights percent | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 ¹ |
|--|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| Gross product distributed to domestic final use..... | 100.00 | 83.7 | 100.0 | 108.0 | 104.8 | 105.4 | 105.7 | 106.4 | 107.0 | 114.3 | 117.3 | 119.0 |
| GERMAN DEMOCRATIC REPUBLIC (1975) | | | | | | | | | | | | |
| Private consumption..... | 59.00 | 82.6 | 100.0 | 110.5 | 111.6 | 110.9 | 113.3 | 114.6 | 117.1 | 119.1 | 121.8 | 124.8 |
| Personal consumption excluding housing..... | 49.31 | 81.00 | 100.0 | 111.7 | 112.9 | 111.9 | 114.6 | 115.9 | 118.7 | 120.9 | 124.1 | 127.4 |
| Housing..... | 9.69 | 94.6 | 100.0 | 104.2 | 105.1 | 106.0 | 106.9 | 107.9 | 108.8 | 109.6 | 110.5 | 111.3 |
| Government, selected elements..... | 11.16 | 89.1 | 100.0 | 111.5 | 113.7 | 116.3 | 118.7 | 120.4 | 121.8 | 122.6 | 123.9 | 125.3 |
| Residual: gross investment, defense, other..... | 29.83 | 97.1 | 100.0 | 109.4 | 103.1 | 84.0 | 72.0 | 71.1 | 72.1 | 75.7 | 76.8 | 78.0 |
| Gross product distributed to domestic final use..... | 100.00 | 86.6 | 100.0 | 110.3 | 109.3 | 103.5 | 101.6 | 102.2 | 104.2 | 106.5 | 108.6 | 110.9 |
| HUNGARY (1976) | | | | | | | | | | | | |
| Private consumption..... | 54.52 | 85.1 | 100.0 | 111.2 | 113.5 | 114.1 | 113.3 | 113.6 | 114.1 | 115.9 | 119.4 | 114.3 |
| Personal consumption excluding housing..... | 42.99 | 84.0 | 100.0 | 111.5 | 113.9 | 114.2 | 112.9 | 113.1 | 113.3 | 115.2 | 119.1 | 112.3 |
| Housing..... | 11.52 | 90.7 | 100.0 | 110.0 | 111.8 | 113.6 | 114.5 | 115.4 | 117.3 | 118.6 | 120.3 | 121.6 |
| Government, selected elements..... | 7.91 | 84.4 | 100.0 | 113.7 | 115.2 | 116.2 | 118.8 | 120.8 | 123.3 | 129.8 | 132.8 | 133.8 |
| Residual: gross investment, defense, other..... | 37.58 | 90.7 | 100.0 | 95.3 | 90.1 | 90.9 | 82.4 | 82.2 | 75.8 | 83.8 | 78.5 | 85.2 |
| Gross product distributed to domestic final use..... | 100.00 | 87.0 | 100.0 | 105.2 | 104.5 | 105.2 | 101.6 | 101.9 | 99.9 | 104.4 | 104.4 | 104.4 |
| POLAND (1977) | | | | | | | | | | | | |
| Private consumption..... | 55.27 | 76.4 | 100.0 | 112.3 | 108.4 | 101.9 | 107.4 | 110.4 | 112.4 | 115.4 | 115.5 | 118.4 |
| Personal consumption excluding housing..... | 46.20 | 74.8 | 100.0 | 111.9 | 106.7 | 98.4 | 104.6 | 107.6 | 109.4 | 112.5 | 112.1 | 115.0 |
| Housing..... | 9.06 | 87.3 | 100.0 | 114.4 | 116.9 | 119.1 | 121.4 | 124.1 | 126.8 | 129.4 | 132.1 | 134.8 |
| Government, selected elements..... | 7.42 | 86.3 | 100.0 | 109.3 | 112.8 | 115.6 | 119.6 | 124.8 | 129.8 | 133.5 | 134.3 | 136.3 |
| Residual: gross investment, defense, other..... | 37.32 | 53.9 | 100.0 | 79.2 | 73.1 | 70.5 | 73.0 | 75.9 | 75.3 | 77.4 | 72.4 | 73.0 |
| Gross product distributed to domestic final use..... | 100.00 | 67.1 | 100.0 | 98.5 | 94.2 | 90.0 | 94.2 | 97.3 | 98.4 | 101.1 | 99.2 | 101.0 |
| ROMANIA (1977) | | | | | | | | | | | | |
| Private consumption..... | 51.08 | 78.0 | 100.0 | 125.9 | 124.7 | 124.0 | 117.8 | 120.8 | 129.9 | 134.8 | 138.3 | (²) |
| Personal consumption excluding housing..... | 46.16 | 76.7 | 100.0 | 127.4 | 125.8 | 124.7 | 117.6 | 120.6 | 130.6 | 135.9 | 139.6 | (²) |
| Housing..... | 4.92 | 89.2 | 100.0 | 112.5 | 115.3 | 117.7 | 120.0 | 122.0 | 123.6 | 124.9 | 126.4 | (²) |
| Government, selected elements..... | 7.96 | 90.8 | 100.0 | 106.3 | 106.7 | 107.5 | 104.0 | 103.2 | 103.6 | 102.9 | 97.3 | (²) |
| Residual: gross investment, defense, other..... | 40.95 | 60.3 | 100.0 | 125.2 | 120.3 | 117.1 | 123.9 | 120.2 | 107.4 | 120.6 | 111.0 | (²) |
| Gross product distributed to domestic final use..... | 100.00 | 72.3 | 100.0 | 123.9 | 121.4 | 119.8 | 119.0 | 119.0 | 118.8 | 126.4 | 124.0 | (²) |
| YUGOSLAVIA (1976) | | | | | | | | | | | | |
| Private consumption..... | 51.97 | 81.7 | 100.0 | 120.1 | 120.5 | 120.8 | 120.8 | 119.9 | 119.8 | 124.1 | 120.9 | (²) |
| Personal consumption excluding housing..... | 42.08 | 81.7 | 100.0 | 119.6 | 119.4 | 118.9 | 118.1 | 116.3 | 115.6 | 120.1 | 115.6 | (²) |
| Housing..... | 9.89 | 81.9 | 100.0 | 122.1 | 125.4 | 128.6 | 131.8 | 134.9 | 137.8 | 140.7 | 143.6 | (²) |
| Government, selected elements..... | 12.81 | 80.4 | 100.0 | 127.1 | 130.9 | 133.9 | 136.4 | 139.2 | 142.7 | 146.6 | 150.2 | (²) |
| Residual: gross investment, defense, other..... | 35.22 | 74.1 | 100.0 | 150.3 | 146.4 | 141.0 | 135.8 | 132.3 | 133.0 | 142.5 | 140.5 | (²) |
| Gross product distributed to domestic final use..... | 100.00 | 78.7 | 100.0 | 132.5 | 131.6 | 130.0 | 128.3 | 126.9 | 127.5 | 133.7 | 131.8 | (²) |

¹ 1988 data are provisional, based on incomplete data or preliminary estimates.² Estimates not yet available.

Source: OP-107 (draft).

Table 7 shows on a per capita basis the trends of private consumption in relation to the total gross product available for domestic final uses. For 1975-88, private consumption excluding housing grows faster than the total of domestic final uses in all countries except Yugoslavia.

TABLE 7.—EASTERN EUROPE: INDEXES OF PER CAPITA REAL DOMESTIC FINAL USES OF GROSS PRODUCT AT ADJUSTED MARKET PRICES, 1970, 1975, AND 1980-88

[Indexes 1975=100]

| | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988* |
|--|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------|
| BULGARIA | | | | | | | | | | | |
| Private consumption..... | 85.2 | 100.0 | 106.6 | 108.5 | 112.8 | 112.7 | 115.0 | 116.5 | 120.8 | 122.5 | 125.6 |
| Personal consumption excluding housing..... | 85.3 | 100.0 | 106.1 | 107.9 | 112.5 | 112.0 | 114.3 | 115.7 | 120.2 | 121.8 | 125.0 |
| Housing..... | 84.7 | 100.0 | 111.3 | 113.6 | 115.9 | 118.2 | 120.7 | 123.2 | 126.0 | 128.4 | 130.9 |
| Gross product distributed to domestic final use..... | 79.1 | 100.0 | 90.4 | 94.8 | 95.4 | 91.4 | 94.6 | 91.8 | 99.4 | 92.9 | 92.6 |
| CZECHOSLOVAKIA | | | | | | | | | | | |
| Private consumption..... | 90.6 | 100.0 | 104.3 | 104.7 | 105.7 | 107.1 | 108.0 | 109.8 | 111.4 | 113.5 | 115.3 |
| Personal consumption excluding housing..... | 89.4 | 100.0 | 104.5 | 104.7 | 105.7 | 107.3 | 108.3 | 110.3 | 112.1 | 114.5 | 116.7 |
| Housing..... | 95.7 | 100.0 | 103.6 | 104.7 | 105.5 | 106.2 | 107.0 | 107.8 | 108.4 | 108.9 | 109.5 |
| Gross product distributed to domestic final use..... | 86.4 | 100.0 | 104.4 | 101.2 | 101.5 | 101.5 | 101.9 | 102.2 | 108.9 | 111.5 | 112.9 |
| GERMAN DEMOCRATIC REPUBLIC | | | | | | | | | | | |
| Private consumption..... | 81.6 | 100.0 | 111.2 | 112.3 | 111.9 | 114.4 | 115.8 | 118.5 | 120.7 | 123.3 | 126.2 |
| Personal consumption excluding housing..... | 80.0 | 100.0 | 112.5 | 113.6 | 112.9 | 115.6 | 117.1 | 120.2 | 122.6 | 125.7 | 128.8 |
| Housing..... | 93.4 | 100.0 | 104.9 | 105.8 | 107.0 | 107.9 | 109.1 | 110.1 | 111.1 | 111.9 | 112.6 |
| Gross product distributed to domestic final use..... | 85.5 | 100.0 | 111.0 | 110.0 | 104.4 | 102.5 | 103.3 | 105.5 | 107.9 | 110.0 | 112.2 |
| HUNGARY | | | | | | | | | | | |
| Private consumption..... | 86.7 | 100.0 | 109.3 | 111.6 | 112.2 | 111.6 | 112.2 | 112.9 | 114.8 | 118.5 | 113.6 |
| Personal consumption excluding housing..... | 85.6 | 100.0 | 109.6 | 112.0 | 112.3 | 111.3 | 111.7 | 112.1 | 114.1 | 118.2 | 111.6 |
| Housing..... | 92.4 | 100.0 | 108.2 | 109.9 | 111.8 | 112.8 | 113.9 | 116.0 | 117.5 | 119.4 | 120.9 |
| Gross product distributed to domestic final use..... | 88.6 | 100.0 | 103.4 | 102.7 | 103.5 | 100.1 | 100.6 | 98.8 | 103.4 | 103.6 | 103.8 |
| POLAND | | | | | | | | | | | |
| Private consumption..... | 79.9 | 100.0 | 107.4 | 102.7 | 95.7 | 99.9 | 101.8 | 102.8 | 104.8 | 104.3 | 106.4 |
| Personal consumption excluding housing..... | 72.8 | 100.0 | 107.0 | 101.1 | 92.4 | 97.3 | 99.2 | 100.0 | 102.2 | 101.3 | 103.3 |
| Housing..... | 91.3 | 100.0 | 109.4 | 110.8 | 111.9 | 112.9 | 114.4 | 116.0 | 117.5 | 119.3 | 121.1 |
| Gross product distributed to domestic final use..... | 70.2 | 100.0 | 94.2 | 89.3 | 84.5 | 87.6 | 89.7 | 90.0 | 91.8 | 89.6 | 90.8 |
| ROMANIA | | | | | | | | | | | |
| Private consumption..... | 81.8 | 100.0 | 120.5 | 118.5 | 117.2 | 111.0 | 113.4 | 121.4 | 125.5 | 128.1 | (²)** |
| Personal consumption excluding housing..... | 80.5 | 100.0 | 121.9 | 119.6 | 117.9 | 110.7 | 113.2 | 122.1 | 126.5 | 129.3 | (²)** |
| Housing..... | 93.6 | 100.0 | 107.7 | 109.6 | 111.2 | 113.0 | 114.6 | 115.6 | 116.3 | 117.1 | (²)** |
| Gross product distributed to domestic final use..... | 75.8 | 100.0 | 118.6 | 115.4 | 113.3 | 112.1 | 111.8 | 111.0 | 117.7 | 114.8 | (²)** |
| YUGOSLAVIA | | | | | | | | | | | |
| Private consumption..... | 85.7 | 100.0 | 115.0 | 114.6 | 114.0 | 113.2 | 111.5 | 110.7 | 113.9 | 110.3 | (²)** |

TABLE 7.—EASTERN EUROPE: INDEXES OF PER CAPITA REAL DOMESTIC FINAL USES OF GROSS PRODUCT AT ADJUSTED MARKET PRICES, 1970, 1975, AND 1980-88—Continued

| | [Indexes 1975=100] | | | | | | | | | | |
|--|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988* |
| Personal consumption excluding housing..... | 85.7 | 100.0 | 114.5 | 113.5 | 112.2 | 110.6 | 108.2 | 106.8 | 110.2 | 105.5 | (2)** |
| Housing..... | 85.9 | 100.0 | 116.9 | 119.2 | 121.4 | 123.5 | 125.5 | 127.3 | 129.1 | 131.1 | (2)** |
| Gross product distributed to domestic final use..... | 82.5 | 100.0 | 126.9 | 125.2 | 122.7 | 120.2 | 118.0 | 117.8 | 122.8 | 120.3 | (2)** |

* 1988 data are provisional, based on incomplete or preliminary data.

** Estimates not yet available.

Sources: OP-107 (draft) and mid-year populations, based on official statistical yearbooks.

Average annual real GNP growth rates may be computed directly from Table 5. For the most part, industry grows faster than overall GNP, and agriculture and forestry more slowly, and erratically because of weather. The comparative rates vary by subperiods and among countries. A table showing rates is omitted for lack of space.

Average annual real growth rates for sectors of domestic final uses of gross product may be calculated directly from Table 6. Particular interest here is directed toward the tradeoffs between the two largest components namely, personal consumption excluding housing and the residual category covering gross investment, defense, and other uses. Some sharp changes in personal consumption for particular years may reflect weather affected agricultural output. The general impression is that personal consumption was kept on a relatively stable trend, and the residual category absorbed the consequences imposed by the total available for domestic final uses.

Trends in factor productivities are of interest in studying economic performance. In practice, however, the outcomes of calculations and international comparisons will be highly dependent on alternative measures of inputs. We present here only indexes of labor productivity in overall GNP and in industry; see Tables 8 and 9. Fixed capital, and combined factor productivity measures at this stage are not considered sufficiently reliable for publication without extensive qualifications. The labor input series are based on official annual employment data. Man-hour series would be preferable, but are not available at this time; thus the findings in these tables are provisional. The 5-year rates are end-point calculations based on $I_n = I_0 (1 + R)^n$.

TABLE 8.—EASTERN EUROPE: LABOR PRODUCTIVITY IN OVERALL GNP AND IN INDUSTRY, 1970, 1975, AND 1980-87

| | [Indexes 1975=100] | | | | | | | | | | |
|------------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | |
| Bulgaria: | | | | | | | | | | | |
| Gross National Product | 82.6 | 100.0 | 103.6 | 105.4 | 108.6 | 106.3 | 110.7 | 107.4 | 112.7 | 111.5 | |
| Industry..... | 86.5 | 100.0 | 110.5 | 111.5 | 113.8 | 115.0 | 117.4 | 117.5 | 120.2 | 120.2 | |
| Czechoslovakia: | | | | | | | | | | | |
| Gross National Product | 87.2 | 100.0 | 107.2 | 106.0 | 107.7 | 108.7 | 110.4 | 110.1 | 111.1 | 111.3 | |

TABLE 8.—EASTERN EUROPE: LABOR PRODUCTIVITY IN OVERALL GNP AND IN INDUSTRY, 1970, 1975, AND 1980-87—Continued

| | [Indexes 1975=100] | | | | | | | | | |
|-----------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
| Industry..... | 85.3 | 100.0 | 112.2 | 113.6 | 114.5 | 115.9 | 117.0 | 118.5 | 119.4 | 121.2 |
| German Democratic Republic: | | | | | | | | | | |
| Gross National Product..... | 86.5 | 100.0 | 108.4 | 109.7 | 108.3 | 109.4 | 111.6 | 114.6 | 116.1 | 118.0 |
| Industry..... | 85.8 | 100.0 | 112.8 | 115.2 | 114.8 | 116.0 | 118.5 | 122.4 | 125.7 | 128.8 |
| Hungary: | | | | | | | | | | |
| Gross National Product..... | 87.1 | 100.0 | 111.9 | 113.7 | 120.1 | 119.9 | 123.5 | 120.6 | 123.7 | 125.6 |
| Industry..... | 88.2 | 100.0 | 120.2 | 124.4 | 128.9 | 134.4 | 139.1 | 137.6 | 139.7 | 147.6 |
| Poland: | | | | | | | | | | |
| Gross National Product..... | 79.7 | 100.0 | 99.1 | 93.2 | 94.7 | 99.6 | 103.1 | 103.2 | 105.4 | 103.2 |
| Industry..... | 80.3 | 100.0 | 101.0 | 88.2 | 90.2 | 96.1 | 98.9 | 100.3 | 100.4 | 99.5 |
| Romania: | | | | | | | | | | |
| Gross National Product..... | 86.0 | 100.0 | 108.9 | 110.0 | 113.3 | 111.4 | 114.1 | 110.6 | 112.3 | 113.2 |
| Industry..... | 118.9 | 100.0 | 94.1 | 93.7 | 92.9 | 92.2 | 95.0 | 93.5 | 93.4 | 96.3 |
| Yugoslavia: | | | | | | | | | | |
| Gross National Product..... | 80.3 | 100.0 | 122.7 | 125.1 | 125.3 | 125.8 | 128.9 | 128.7 | 131.2 | 128.3 |
| Industry..... | 95.7 | 100.0 | 119.0 | 116.6 | 111.4 | 111.0 | 111.1 | 108.9 | 108.7 | 105.9 |

Sources: OP-105 (draft) and Project employment estimates.

TABLE 9.—EASTERN EUROPE: GROWTH RATES OF LABOR PRODUCTIVITY IN OVERALL GNP AND IN INDUSTRY, 1970-87

| | [Percent per year] | | | | | | | | | |
|-----------------------------|--------------------|---------|---------|-------|------|------|------|------|------|------|
| | 1970-75 | 1975-80 | 1980-85 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
| Bulgaria: | | | | | | | | | | |
| Gross National Product..... | 3.9 | 0.7 | 0.7 | 1.8 | 3.1 | -2.1 | 4.1 | -3.0 | 4.9 | -1.0 |
| Industry..... | 2.9 | 2.0 | 1.2 | .8 | 2.1 | 1.0 | 2.2 | .0 | 2.3 | .0 |
| Czechoslovakia: | | | | | | | | | | |
| Gross National Product..... | 2.8 | 1.4 | .5 | -1.1 | 1.6 | .9 | 1.5 | -.2 | .9 | .2 |
| Industry..... | 3.2 | 2.3 | 1.1 | 1.3 | .8 | 1.2 | .9 | 1.3 | .8 | 1.5 |
| German Democratic Republic: | | | | | | | | | | |
| Gross National Product..... | 2.9 | 1.6 | 1.1 | 1.1 | -1.3 | 1.0 | 2.0 | 2.7 | 1.3 | 1.6 |
| Industry..... | 3.1 | 2.4 | 1.6 | 2.1 | -.3 | 1.0 | 2.2 | 3.3 | 2.7 | 2.4 |
| Hungary: | | | | | | | | | | |
| Gross National Product..... | 2.8 | 2.3 | 1.5 | 1.6 | 5.6 | -.1 | 3.0 | -2.3 | 2.5 | 1.6 |
| Industry..... | 2.5 | 3.7 | 2.7 | 3.5 | 3.6 | 4.3 | 3.5 | -1.1 | 1.5 | 5.6 |
| Poland: | | | | | | | | | | |
| Gross National Product..... | 4.6 | -.2 | .8 | -5.9 | 1.6 | 5.2 | 3.5 | .2 | 2.1 | -2.1 |
| Industry..... | 4.5 | .2 | -.1 | -12.7 | 2.2 | 6.6 | 3.0 | 1.4 | .1 | -.9 |
| Romania: | | | | | | | | | | |
| Gross National Product..... | 3.1 | 1.7 | .3 | 1.1 | 3.0 | -1.7 | 2.5 | -3.1 | 1.6 | .8 |
| Industry..... | -3.4 | -1.2 | -.1 | -.4 | -.9 | -.7 | 3.0 | -1.6 | -.1 | 3.1 |
| Yugoslavia: | | | | | | | | | | |
| Gross National Product..... | 4.5 | 4.2 | 1.0 | 2.0 | 0.2 | .4 | 2.5 | -.2 | 2.0 | -2.2 |
| Industry..... | 0.9 | 3.5 | -1.8 | -2.0 | -4.5 | -.3 | .1 | -2.0 | -.2 | -2.5 |

Source: Calculated from table 8.

The low and declining rates of growth of labor productivity, 1970-87, underlie the widely expressed concerns for economic reform. We cannot analyze here the causes for the decline, but many factors would enter such analyses. Remedial measures to revive growth would address, among other things, modernization of capital stock, price reforms, decentralization of decisionmaking, policies toward joint ventures with Western partners, dependable incentives for innovation and initiative for enterprises and employ-

ees—a whole host of desiderata. There are evident bureaucratic reshufflings, some glasnost, draft reform programs, export incentives, some aspects of reprivatization, etc. But the story ultimately will be expressed in performance statistics, hopefully in prices that reflect factor costs and market guidance.

The changing sectoral structure of GNP by origin for the 1975–88 period is implicit in corresponding real growth indexes and their weights. Some general impressions as to the emerging structural shares may be gained by scanning Table 5. The percentage share for industry in the total GNP of each of the seven countries is the largest and is growing in all countries except Poland.

Similar findings as to the changing structure of the total of domestic final uses of gross product are implicit in our Table 6 weights and real growth indexes. With the total available for domestic final uses growing rather slowly in the 1980's, and with social policies directed toward avoiding hostile attitudes by the population toward the governing Party, the outcome is increasing shares of personal consumption and offsets by the large residual use category comprising investment, defense, and other uses.

V. DOLLAR LEVELS OF GNP

Table 10 presents our estimates of seven East European GNP's at constant 1988 dollars at 5-year intervals, 1970–85, and for 1988. The 1988 estimates are based on preliminary and incomplete data and are provisional. Our interest in showing dollar estimates is twofold: (1) to derive a set of weights for combining some of our measures for the seven individual countries into a total for the seven combined, and (2) to provide plausible dollar per capita levels for orientation and comparisons with other countries that have such dollar level figures.

TABLE 10.—EASTERN EUROPE: GNP AT CONSTANT 1988 DOLLARS, 1970, 1975, 1980, 1985, AND 1988

(A) OVERALL GNP

(Millions of dollars; index 1975 = 100)

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia | Total, Eastern Europe | |
|-----------|----------|----------------|---------|---------|---------|---------|------------|-----------------------|------------------|
| | | | | | | | | Million dollars | Index 1975 = 100 |
| 1970..... | 46,361 | 108,467 | 134,913 | 65,441 | 183,387 | 75,240 | 85,560 | 699,369 | 79.0 |
| 1975..... | 58,242 | 127,909 | 159,850 | 76,989 | 251,215 | 104,067 | 106,950 | 885,222 | 100.0 |
| 1980..... | 61,212 | 142,491 | 179,352 | 85,073 | 260,259 | 126,233 | 139,784 | 994,403 | 112.3 |
| 1985..... | 63,775 | 151,316 | 197,095 | 87,921 | 268,046 | 138,617 | 148,981 | 1,055,753 | 119.3 |
| 1988..... | 67,561 | 158,223 | 207,166 | 91,771 | 275,834 | 151,313 | 154,115 | 1,105,983 | 124.9 |

(B) PER CAPITA GNP

(GNP in dollars; population in millions)

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia | Total, Eastern Europe | United States |
|-----------|----------|----------------|-------|---------|--------|---------|------------|-----------------------|---------------|
| 1970..... | 5,500 | 7,600 | 7,900 | 6,300 | 5,600 | 3,700 | 4,200 | 5,700 | 14,400 |
| 1975..... | 6,700 | 8,600 | 9,500 | 7,300 | 7,400 | 4,900 | 5,000 | 6,900 | 15,200 |

(B) PER CAPITA GNP—Continued

[GNP in dollars; population in millions]

| Year | Bulgaria | Czechoslovakia | GDR | Hungary | Poland | Romania | Yugoslavia | Total, Eastern Europe | United States |
|---|----------|----------------|--------|---------|--------|---------|------------|-----------------------|---------------|
| 1980..... | 6,900 | 9,300 | 10,700 | 7,900 | 7,300 | 5,700 | 6,300 | 7,600 | 17,000 |
| 1985..... | 7,100 | 9,800 | 11,800 | 8,300 | 7,200 | 6,100 | 6,400 | 7,800 | 18,300 |
| 1988..... | 7,500 | 10,100 | 12,400 | 8,700 | 7,300 | 6,600 | 6,500 | 8,100 | 19,700 |
| 1988 as a percent of United States... Population 1988 (millions)..... | 38.1 | 51.3 | 62.9 | 44.2 | 37.1 | 33.5 | 33.0 | 41.1 | 100.0 |
| | 9.0 | 15.6 | 16.7 | 10.6 | 37.9 | 23.1 | 23.5 | 136.3 | 246.3 |

Source: OP-105 (draft), tables 16 and 17.

Our procedure is outlined in *OP-105*, but we briefly restate it here. Two substantial considerations enter our calculations. First, we regard our estimated growth rates at domestic adjusted factor cost as sound for international comparisons from the standpoint of valuation and methodology, as explained in section III, above. Consistent application of our methodology in SNA concepts to seven East European countries supports comparability of the derived estimates among the seven countries, and indeed, more broadly with market-type economies of the West. Second, we accepted the data for 1975 provided by the International Comparisons Project (ICP) work of Kravis and his associates, based on purchasing power parity ratios for baskets of goods and services with well-defined specifications. The ICP estimates for 1975 in 1975 "international dollars" for Hungary, Poland, Romania, and Yugoslavia by their date (1975) fit well with the mid-1970's weight-base years for our GNP growth rate estimates.

We can apply directly our GNP growth indexes to the ICP 1975 total GDP values for 4 of our 7 countries, but we had to approximate indirectly 1975 values at ICP levels for Bulgaria, Czechoslovakia, and the GDR. We started from 1970 ratios of overall GDP's based on United Nations estimates for the seven countries.¹² The 1970 U.N. comparative GDP levels are characterized by the U.N. source as more or less satisfactory over a broad array of countries, and we assumed that strictly as ratios among the seven East European countries they were even more defensible. We moved these ratios to 1975 using our GNP growth indexes. Then, using the derived 1975 ratios, we scaled in approximations to 1975 ICP levels for Bulgaria, Czechoslovakia, and the GDR, each successively in relation to the directly given ICP country values for Hungary, Poland, Romania, and Yugoslavia, with the results averaged for each. The directly given 1975 ICP levels for four countries and the scaled in values for the remaining three countries were moved from 1975 to other years using our GNP real growth indexes. The U.S. GNP implicit price deflator was used to convert the 1975 dollars to 1988 dollars.¹³

¹² See U.N., *Economic Bulletin for Europe*, vol. 31, No. 2, for a detailed exposition of estimative procedures, results, and qualifications.

¹³ See *OP-105*, for a detailed statement of sources and methods.

The paper in the present volume by Gerhard Fink and Peter Havlik presents a survey of GDP dollar estimates and their estimates based on PIG (physical indicators global) methods. All approaches to comparisons in a common currency have shortcomings, both theoretical and practical. The index number problem enters such comparisons. Their final conclusion is that there are no clearly defined scientific criteria for estimating comparative developmental levels of the CPE's and that ultimately the only test is plausibility and juxtaposition of alternative figures.

Our growth rate estimates rest on a foundation of adjusted factor cost domestic valuations. On grounds of plausibility, we expect our Table 10 dollar estimates to be within the range of acceptable values. In 1988 as percentages, per capita, of the U.S.A. as 100, the overall seven-country level is 41.1 percent. The GDR ranks highest (62.9), followed by Czechoslovakia (51.3), Hungary (44.2), Bulgaria (38.1), Poland (37.1), Romania (33.5), and Yugoslavia (33.0). At the total GNP level in 1988, the East European seven-country total was close to one-fourth of the U.S. level, and its population was about 55 percent of the U.S.A. figures.

VI. CONCLUDING REMARKS

The present essay reviews the past performance of the East European economies from the viewpoint of intertemporally and internationally comparable statistics of GNP, domestic final uses of gross product and labor productivity. Official East European statistics, because of their distorted prices as compared to factor cost and scarcity pricing, are seriously misleading for real growth and structure measures even for one country, and they are all the more inadequate for intra-CMEA and market-type economies comparisons.

Eastern Europe had very largely exhausted the sources for rapid growth along the lines of the Soviet model by the 1960's. The slowdown since then has been steep, and serious efforts will be required to resume rapid growth through intensive means, promoting growth of factor productivities.

The problem of lagging growth comprises not only poor economic policies, but also sociopolitical aspects. Efforts aimed at restoring growth and providing the populations with increasing quality and levels of living will have to address human motivations. Reprivatization in essence, if not in label, would seem to be a big item on the agenda for the future.

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II. OCCASIONAL PAPERS (OP'S) OF THE RESEARCH PROJECT ON NATIONAL INCOME IN EAST CENTRAL EUROPE

(Note: A complete listing of the OP's is available from L.W. International Financial Research, Inc., 633 West 115th Street, New York, NY 10025.)

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OP-64.—Thad P. Alton, Elizabeth M. Bass, Gregor Lazarcik, and Wassyl Znayenko. *The Structure of Gross National Product in Eastern Europe (Derivation of GNP Weights for 1975-1977)* (1981).

OP-79.—Joseph T. Bombelles. *The Structure of Gross National Product of Yugoslavia, 1976* (1983).

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OP-100.—Thad P. Alton, Elizabeth M. Bass, Christopher Badach, Gregor Lazarcik, Joseph T. Bombelles, and George J. Staller. *Economic Growth in Eastern Europe, 1970 and 1975-1987* (1988).

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HEALTH AND MORTALITY IN EASTERN EUROPE, 1965 TO 1985

By Nicholas Eberstadt*

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SUMMARY

Over the past generation the population of the Soviet Union has experienced mounting health problems, and suffered a long-term decline in life expectancy. These facts—now officially acknowledged in Moscow—are widely known in the West. What is perhaps less well known is that parallel trends have beset the Communist countries of Eastern Europe.

Eastern Europe's health setbacks have not, to date, been as severe as those witnessed in the U.S.S.R. Nevertheless, declining life expectancy at birth is now characteristic of the region. For industrialized societies during peacetime, such a trend is unprecedented.

Between 1965 and 1985, infant mortality in Eastern Europe continued its decline; the pace of improvement, however, was slower than in Western Europe, where rates were typically already lower. For Warsaw Pact Europe, life expectancy at age 1 fell by almost a year between 1966 and 1985. This decline reflected a rise in adult mortality. The rise was particularly pronounced among Eastern European males of working age.

For Warsaw Pact Europe, age-standardized death rates were higher for men in 1985 than they had been in the late 1950's; for women, they were only slightly lower in 1985 than they had been in the late 1960's. Cause-of-death data suggest that this rise in male mortality, and the virtual cessation of mortality decline for women, can be arithmetically ascribed to an increase in deaths attributed to cardiovascular disease (CVD). A substantial rise in age-standard-

*Harvard Center for Population Studies, American Enterprise Institute. Prepared with the able assistance of Elizabeth Blackshire. The author would like to extend special thanks to Antonio Lopez of the World Health Organization, Godfrey Baldwin and Ward Kingkade of the U.S. Bureau of the Census, and Murray Feshbach of Georgetown University. None of these individuals, of course, should be held accountable for judgments or arguments expressed herein.

ized deaths attributed to CVD is also reported for Yugoslavia between the mid-1960's and 1985.

A few of the possible factors that might help to explain Eastern Europe's mounting health problems are patterns of cigarette use, trends in habitual heavy drinking of hard spirits, and the performance of the state health care services. Less quantifiable factors may also have played a role in the deterioration of health conditions under these Soviet-style regimes during an era of self-proclaimed "mature socialism" and self-assessed socioeconomic progress.

I. INTRODUCTION

Students of public health and informed nonspecialists alike are by now generally aware that the Soviet Union has suffered a pronounced and protracted deterioration in health on the part of much of its population over the past several decades. The outlines of this health problem were first noted in the mid-1970's.¹ By the early 1980's, the phenomenon had become a topical focus of analysis and commentary in the West.² By the late 1980's, several years into the Gorbachev *glasnost* campaign, Soviet officials were publicly examining, and declaiming upon, the dimensions and the causes of the health setbacks the country had suffered over the preceding generation.³

The countries of Communist Eastern Europe have also been beset by mounting health problems over the past generation. In a variety of respects, these problems parallel those of the contemporary U.S.S.R. To be sure: Eastern European health setbacks, on the whole, have been less marked. Nevertheless, throughout Eastern Europe⁴ death rates for adult age groups have registered long-term increases. Declining life expectancy at birth, moreover, is today a characteristic trend for the region.

Glasnost notwithstanding, official discussion of local health problems has been (and remains) more open, and health-related data more comprehensive, for Eastern Europe than for the Soviet Union. Such data and discussions provide a somewhat more detailed picture of the anatomy of secular health decline in industrial society than are to date available from the U.S.S.R.

II. DIMENSIONS OF MORTALITY CHANGE

Indicators of health and disease for human populations are diverse. But as Uemura has noted, "data on mortality are the most standardized of all disease statistics."⁵ The singular import of this particular measure of "health," moreover, is beyond dispute.

¹ See, for example, Murray Feshbach and Stephen Rapawy, "Soviet Population and Manpower Trends," in U.S. Congress Joint Economic Committee, *Soviet Economy in a New Perspective* (Washington, DC: U.S. Government Printing Office, 1976).

² For example, Christopher Davis and Murray Feshbach, *Rising Infant Mortality in the USSR in the 1970s* (Washington, DC: U.S. Bureau of the Census, Series P-95, No. 70, 1980).

³ For example, see Anatoliy Vishnevskiy, "Has the Ice Cracked? Demographic Processes and Social Policy," *Kommunist* No. 6, 1988, translated in Joint Publication Research Service (JPRS), Series UKO, No. 88-011 (July 11, 1988).

⁴ Sadly, Albania must be excluded from this assessment.

⁵ K. Uemura, "International Trends in Cardiovascular Disease in the Elderly," *European Heart Journal* 1988, No. 9, Supplement D.

The simplest, and most intuitively obvious, indicator of overall mortality for a national population is its expectation of life at birth. Table 1 presents data on life expectancy at birth for Eastern Europe and the U.S.S.R. In the 1950's and very early 1960's, the pace of improvement in life expectancy at birth in the Soviet Union and Eastern Europe had been quite rapid. Between the early 1950's and the early 1960's, for example, the United Nations Population Division estimates that life expectancy at birth rose by over 5½ years for the countries of Soviet Bloc Europe, and by 6½ years in Yugoslavia; by contrast, the increase for the United States during that same period is estimated to have been only 1 year.⁶ By the mid-1960's, however, improvements in the life expectancy in Eastern Europe had decelerated sharply, even as progress in life expectancy in Western Europe and North America was quickening. In the 1970's and early 1980's, increases in life expectancy for women in Eastern European countries were, at best, halting, and life expectancy at birth for men fell throughout the region. Overall, life expectancy at birth ceased its rise; indeed, every country in Eastern Europe has registered at least some decline in this measure in the period since 1965. With the single exception of East Germany, these declines have continued through the most recent period for which data are available.

The drop in overall life expectancy at birth in the various countries of Communist Europe has not been nearly as sharp over the past generation as in the U.S.S.R. Even so: Eastern Europe's recent health record seems to represent something that is fundamentally new. In the past, industrialized countries have witnessed periods of slow overall health progress (as, for example, 1955-65 proved to be for many OECD member states). Many industrialized countries, moreover, have registered slight, temporary declines in life expectancy on their advance to greater longevity. No region of the industrialized world, however, has heretofore experienced the sort of interruption, and actual reversal, of health progress during peacetime that is now being recorded in the societies of Communist Europe.

Life expectancy at birth is a summary measure reflecting survival probabilities for individuals of all ages. To understand what has been occurring in Eastern Europe, it is useful to separate this measure into two subsidiary components: survival chances for children from birth to the age of one (as represented in the infant mortality rate) and expectation of life at 1 year of age.

Unlike the U.S.S.R. (where, after a decade of statistical silence, authorities now report the infant mortality rate for the mid-1980's to be higher than the one recorded in 1970), infant mortality rates in Eastern Europe underwent steady decline between 1965 and 1985. The tempo of improvement in Eastern European infant mortality rates, however, was slower during those years than in Western Europe—even though infant mortality rates for Western Europe as a whole were already considerably lower. (See Table 2.)

In 1985, infant mortality was reported to be roughly two-thirds higher in Soviet Bloc Europe than in Western Europe. These num-

⁶ United Nations, *World Population Prospects As Assessed in 1984* (New York: United Nations Department of International Economic and Social Affairs, 1986).

bers may actually understate the true differential. As Klinger noted in 1982—

only a few countries in [socialist Europe] used the standard definitions [for infant mortality] provided by the U.N. and the WHO [World Health Organization]. . . even in 1979 national definitions in four of these countries—Bulgaria, Romania, and to a lesser extent Poland and Yugoslavia—differed from the international recommendations.⁷

In Poland, according to Okolski, “the infant mortality rate is underestimated and [has been] artificially lowered since 1964.”⁸ By his estimate, Poland’s infant mortality rate in 1980 would have been almost a fourth higher than was reported if international WHO definitions had been used.⁹ In Bulgaria and Yugoslavia, the proportion of total infant deaths attributed to the neonatal period (the first 28 days of life) is strangely low, and inconsistent with the ratios of other European societies adhering to the international standard definition of infant mortality. Adjustments for the underreporting of neonatal mortality could raise the infant mortality rate in these two countries by 40 percent or more. As for Romania, reports of local practices indicate that births need not be registered at all during the first month—precisely the time when infant fatality is most likely.¹⁰ Perhaps not surprisingly, Romania reports that neonatal deaths account for only a small fraction of the country’s infant mortality. If its definitions and procedures for recording infant mortality conformed with the international norm proposed by the WHO, Romania’s infant mortality rate might easily be 80 percent higher than what Bucharest currently reports.¹¹ (Such serious underreporting of infant mortality, it should be noted, would have a consequential impact on overall estimates of life expectancy; increasing Romania’s measured infant mortality rate by 80 percent would reduce the country’s measured life expectancy at birth by more than a year.)

Definition and registration of death tends to be more uniform for children, youths, and adults than it is for babies. Table 3 presents data on life expectancy at age 1 in Eastern Europe, Western Europe, and the Soviet Union. Although East Germany enjoyed some improvement by this measure between 1965 and 1985, the rest of the Warsaw Pact did not. In fact, the unweighted average for the group showed a decline for those years; for 1966 to 1985, life expectancy at age 1 fell by nearly a year. While this drop was not as great as the U.S.S.R.’s, it contrasts with a rise of almost 3 years for an unweighted average of 18 Western European countries. In Yugoslavia, life expectancy at age 1 did rise between the mid-1960’s and the mid-1980’s; improvements in non-Communist countries in Southern Europe (Greece, Portugal, and Spain), however, were more substantial.

⁷ A. Klinger, *Infant Mortality in Eastern Europe, 1950-1980* (Budapest: Statistical Publishing House, 1982), p. 2.

⁸ Marek Okolski, “Demographic Transition in Poland. The Present Phase,” *Oeconomia Polona*, 1983, No. 2, 211.

⁹ *Ibid.*

¹⁰ See, for example, Anonymous, “Birth and Death in Romania,” *New York Review of Books*, Oct. 26, 1986.

¹¹ Adjustments computed by imputing the same ratio of postneonatal mortality to overall infant mortality to Bulgaria, Yugoslavia, and Romania as reported for Czechoslovakia.

Slow progress, or absolute decline, in life expectancy at age 1 in Communist Europe is due principally to changes in life expectancy among adults. Table 4 depicts changes in life expectancy at age 30 in Eastern Europe, Western Europe, and the U.S.S.R. For Warsaw Pact Europe as a whole, life expectancy for women increased only marginally between 1965 and 1985; it fell for men in every country, and by an unweighted average of over 2 years. In each country, overall life expectancy for persons 30 years of age was lower in 1985 than it had been in 1965. Once again, deteriorations in health conditions were less pronounced than in the U.S.S.R. (where life expectancy for adult women almost certainly declined), but compare unfavorably with the health progress registered in Western Europe. Adult life expectancy, by this measure, is now about 3½ years lower for both men and women in Soviet Bloc Europe than in Western Europe; in 1965, the levels had been virtually even. In Yugoslavia, life expectancy for adult men declined between 1965 and 1985; overall life expectancy for adults was also down. By contrast, the average for Greece, Portugal, and Spain rose by almost 2 years for men, and by over 2 years for women.

Age-specific mortality rates provide a more detailed glimpse at the changing patterns of adult health in Eastern Europe. (See Table 5.) Soviet Bloc Europe saw a broad rise in death rates for adult men between 1965 and 1985; only in East Germany were declines recorded, and there only for a few cohorts. For the region as a whole, death rates for men in their sixties rose by about 10 percent between 1965 and 1985; for those in their thirties, by over 20 percent; for those in their fifties, over 30 percent; for those in their forties, by over half. Among women, rising death rates were registered for at least some adult cohorts in all Soviet Bloc Europe, with the exceptions of East Germany and Romania. (Romania's data, however, are not for 1985. Between its 1986 and its 1987 editions, Bucharest's official statistical yearbook, *Anuaral Statistic*, collapsed from about 400 pages down to scarcely to 130 pages; mortality data was one of many topics omitted in the newly slim volume.) In Yugoslavia, mortality decline among adult women was more regular and substantial than in the rest of Communist Europe, but death rates for men in their forties, fifties, and early sixties rose measurably over the course of the two decades.

What can account for this deterioration of health conditions among Eastern Europe's adult populations? Some have suggested that rising adult mortality may be a delayed consequence of the calamitous stresses suffered by local populations during World War II.¹² While this hypothesis has its merits, it is inadequate to explain the peculiar health trends now in evidence in Eastern Europe in their entirety. For one thing, death rates in Warsaw Pact Europe are typically higher today than 20 years ago for men in their early thirties—higher, in other words, for those born a decade after World War II than for those who lived through it. Second, today's rise in mortality in Eastern Europe is inconsistent with patterns of mortality described in research on the demographic after-

¹² For example, R.H. Dinkel, "The Seeming Paradox of Increasing Mortality in a Highly Industrialized Nation: The Example of the Soviet Union," *Population Studies*, March 1985.

effects of major conflicts. Horiuchi¹³ has presented evidence that unusually high mortality in later life for those surviving a major war is characteristic of the cohort of boys just under draft age at the time of the war in question; in Warsaw Pact Europe, by contrast, the rise in mortality has been general among adult males, and in such places as Hungary, general among adult females as well. Third, deterioration in adult health levels is not characteristic of all populations that suffered heavily during World War II. Japan suffered severe privation during and immediately after the Second World War, yet it has enjoyed substantial and steady improvements in adult health during the postwar decades. Within the German population—which experienced World War II as a single country—dramatic differences in adult health progress are today apparent between East and West Germany in every cohort. (See Table 6.)

III. CHANGING CAUSE-OF-DEATH PATTERNS

How, then are the health problems of contemporary Eastern Europe to be explained? Some preliminary insights may be afforded by data on causes of death. Such data must be used with caution. Even in industrialized countries, these figures are less standardized than one might suppose. As Brzezinski has warned, “variations between different countries in diagnostic practices and coding of the death certificates give cause to doubt the validity of causes of death.”¹⁴ Even within the European Economic Community, he notes, “large differences in coded cause of death were found within and between countries.”¹⁵ Practices in certain Eastern European countries, moreover, are somewhat less than standard on their very face: East Germany, for example, simply does not report deaths from homicide, suicide, or “accidents and adverse effects.”

For all these limitations, a review of recent data on mortality by cause of death may nevertheless prove instructive. Tables 7 and 8 present data on age standardized death rates by reported cause of death for Eastern and Western Europe. The reference population against which death rates are standardized, a “European Model” devised by the WHO, is, like Europe itself, weighted toward older age groups in its composition. It therefore tends to be more sensitive to changes in mortality among the middle aged and the elderly—precisely the groups that seem to have suffered setbacks in health in Eastern Europe in recent decades.

By the mid-1980's, age standardized death rates for men were over a third higher in Warsaw Pact Europe than Western Europe, and over two-fifths higher among women. (See Table 7.) For most (though not all) reported causes of death, standardized mortality rates for men and women were higher in Eastern than in Western

¹³ S. Horiuchi, “The Long Term Impact of War on Mortality: Old-Age Mortality of the First World War Survivors in the Federal Republic of Germany,” *Population Bulletin of the United Nations*, No. 15, 1983.

¹⁴ Zbigniew J. Brzezinski, “Mortality Indicators and Health-for-All Strategies in the WHO European Region,” *World Health Statistics Quarterly* 39, No. 4, (1986), p. 365.

¹⁵ *Ibid.*; his citation is M.C. Kelson and R.F. Heller, “The Effect of Death Certification and Coding Practices on Observed Differences in Respiratory Disease Mortality in Eight EEC Countries,” *Revue D'Epidemiologie Et De Sante Publique* 31, No. 4 (1983), p. 423.

Europe. In relative terms, the greatest differentials were to be found in death from liver disease (including cirrhosis) and in diseases of the circulatory system (including heart attack, stroke, and arteriosclerosis). In absolute terms, deaths from diseases of the circulatory system dominate the contemporary differential in standardized mortality between Eastern and Western Europe. Over three-fifths of the difference in standardized rates for men, and almost nine-tenths of the overall difference for women, can be ascribed to differences in death rates from cardiovascular disease alone. In specific comparisons of more selected areas of Communist and non-Communist Europe (e.g., East versus West Germany, Yugoslavia versus Greece, Portugal, and Spain), standardized death rates from cardiovascular disease are consistently reported to be substantially higher in the East, and can account for the great majority of existing mortality differentials for both males and females. (See Tables 7B and 7C.)

Table 8 traces standardized mortality rates by reported cause of death back, where data permit, to the late 1950's. Absolute differences in age-standardized mortality between Warsaw Pact Europe and Western Europe narrowed slightly between 1955-59 and 1965-69, but have widened rapidly since then. Differences in mortality from cardiovascular disease explain much of the overall difference in standardized mortality between these two regions over the past two decades, and indeed seem to help account for their disparate trends in overall mortality.

Whereas the level of deaths attributed to cardiovascular disease has been declining since at least the late 1950's for Western European men, and since the late 1960's for Western European women, in Eastern Europe the level has been on the rise for men since at least the late 1950's, and for women since the late 1960's. In Warsaw pact Europe today, moreover, standardized male and female death rates for cardiovascular disease are higher than they were in Western Europe at their peak postwar levels. A growing differential in deaths attributed to heart disease accounts by far for the greatest portion of the expanding gap between mortality levels in Communist and non-Communist Europe. These divergent trends in death from heart disease appear largely to explain (if only arithmetically) the discrepant paths of health change in Eastern and Western Europe over the past generation. It may be observed that the same holds true for comparisons of more specific areas. (See Tables 8B and 8C.)

IV. POTENTIAL FACTORS IN RECENT EASTERN EUROPEAN HEALTH PROBLEMS

How are the divergent trends in Eastern and Western European mortality—particularly in mortality attributed to cardiovascular disease—to be explained? The question might be easily answered if the proximate and underlying causes of changing patterns of heart disease among national populations were well understood. Unfortunately—and perhaps surprisingly—no such understanding can be said to exist at present. As WHO researchers have noted:

A great deal of epidemiological research was initiated after the 1950's to explain the risk factors and natural history of CVD [cardiovascular disease]. However, nei-

ther these studies nor an analysis of national mortality statistics could adequately explain the dynamics of changes in CVD.¹⁶

As Lamm has pointed out, there is no "definitive answer"—"in Europe or elsewhere"—"to the question of whether decrease in [CVD] mortality is attributable to better treatment or to progress in prevention."¹⁷ Indeed: one may get a sense of just how little is actually understood (and agreed upon) about factors relating to heart disease by reviewing the stated primary objective of the WHO's project for Monitoring Trends and Determinates in Cardiovascular Disease (the MONICA project, officially begun in 1984):

To measure trends and determinants in [CVD] . . . and to assess the extent to which these trends are related to changes in known risk factors, daily living habits, health care, or major socioeconomic features measured at the same time in defined communities in different countries.¹⁸

While considerable dispute and uncertainty remain over the precise etiology of cardiovascular disease in national populations (and over the correspondence between the disease and subsequent mortality), it may do well to review some of the ecological relationships in Eastern Europe between major risk factors commonly associated with cardiovascular disease and local populations. Such factors may also have a more general relevance to health conditions in Eastern Europe. Indeed, as Grabauskas has recently written, "a number of characteristics traditionally considered as cardiovascular risk factors have in fact a much broader negative impact on health."¹⁹

(A) SMOKING

Medical research and epidemiological studies have long associated heavy tobacco use with a variety of health problems.²⁰ One of these is increased risk of cardiovascular disease.²¹ Preston, for example, has argued that the slowdown in health progress (and increase in mortality from heart disease) among older men in the United States and some other Western countries in the generation following the Great Depression can be explained (in a statistical sense) by the corresponding rise during those decades in cigarette smoking.²²

¹⁶ "WHO MONICA Project: Geographic Variation From Cardiovascular Diseases," *World Health Statistics Quarterly*, 40, No. 2 (1987), p. 171.

¹⁷ G. Lamm, *The Cardiovascular Disease Programme of WHO in Europe: A Critical Review of the First 12 Years* (Copenhagen: WHO Regional Office For Europe, 1981), p. 35.

¹⁸ WHO MONICA Project Principal Investigators, "The World Health Organization MONICA Project (Monitoring Trends and Determinants in Cardiovascular Disease): A Major International Collaboration," *Journal of Clinical Epidemiology* 41, No. 2, 1988, p. 106.

¹⁹ V. Grabauskas, et al., "Risk Factors as Indicators of Ill Health," in E.I. Chazov, R.G. Oganov, and N.V. Perova, eds. *Preventive Cardiology: Proceedings of the International Conference on Preventive Cardiology: Moscow, June 23-26, 1985* (New York: Harwood Academic Publishers, 1987), p. 308.

²⁰ For one comprehensive review of the evidence, see *Smoking and Health: A Report of the Surgeon General* (Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1979).

²¹ *Smoking and Health*, op. cit., Chapters 2 and 3; see also *Health consequences of Smoking: Cardiovascular Disease: A Report of the Surgeon General* (Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1983), esp. p.iv: "Cigarette smoking should be considered the most important of the known modifiable risk factors for coronary disease in the United States."

²² Samuel H. Preston, *Older Male Mortality and Cigarette Smoking: A Demographic Analysis* (Berkeley, CA: University of California, Institute of International Studies, 1970).

Table 9 presents U.S. Department of Agriculture (USDA) estimates of annual per capita cigarette consumption for the population 15 years of age and older for the countries of Eastern Europe. Between 1965 and 1980, per capita consumption in Warsaw Pact Europe is estimated to have risen by more than a third; in Yugoslavia it is estimated to have risen by over 70 percent. Cigarette consumption in Warsaw Pact Europe, by these estimates, is today significantly higher than in a representative sample of six Western European countries; as recently as 1970, it was higher in the latter.

Available data suggest that a greater fraction of the adult population smokes in Eastern Europe than in a number of Western countries. A 1985 survey in Poland, for example, estimated that 71 percent of men and 56 percent of women aged 30 to 34 were smokers.²³ That same year, East Germany's Committee for Health and Nutrition announced that nearly 60 percent of boys and 50 percent of girls aged 14 to 18 were smokers.²⁴ In the United States, by contrast, the 1985 figures for persons 25 to 44 years of age were 40 percent for men and 38 percent for women for those 20 to 24, the respective proportions were 30 and 32 percent.²⁵

Not only are Eastern European populations smoking more than the Western European public, but there is reason to believe that they are also smoking stronger cigarettes. In the United States, the "tar" rating of the sales-weighted average cigarette declined by nearly two-thirds between 1954 and 1980, and the nicotine rating by over half;²⁶ much of the decline can be ascribed to the spread of the filter-tipped cigarette. Similar patterns can be seen in Western Europe. By contrast, as of 1980, fewer than half of the cigarettes sold in Poland were filtered; in Sweden, the corresponding proportion was over 90 percent.²⁷

For Western Europe as a whole, per capita cigarette use is estimated to have been declining since the mid-1970's; in some European societies, it is estimated to have been declining since the 1960's. In Warsaw Pact Europe and Yugoslavia, per capita cigarette consumption stabilized in the 1980's. It is not clear, however, whether this interruption of earlier upward trends signifies a change in popular attitudes and preferences (as in Western Europe's consumption declines), or merely reflects the economic problems characteristic of the region over the past decade.

²³ World Bank, *Poland: Reform, Adjustment, and Growth, Volume II* (Washington, DC: International Bank for Reconstruction and Development, 1987), p. 398. Sample size was reported as 400,000.

²⁴ Sophia M. Miskiewicz, "Social and Economic Rights in Eastern Europe," *Survey* 29, No. 4, (August 1987), p. 61.

²⁵ U.S. Bureau of the Census, *Statistical Abstract of the United States 1988* (Washington, DC: U.S. Government Printing Office, 1988).

²⁶ Derived from *The Health Consequences of Smoking. The Changing Cigarette: A Report of the Surgeon General* (Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1981), Statistical Annex.

²⁷ R.J.W. Melia and A.V. Swan, "International Trends in Mortality Rates for Bronchitis, Emphysema and Asthma During the Period 1971-1980," *World Health Statistics Quarterly* 39, No. 2, (1986), p. 214.

(B) DRINKING

While many of the particulars in the correspondence between drinking and heart disease²⁸ (and even of the correspondence between drinking and liver cirrhosis²⁹) within national populations are still debated, few health specialists would contest the proposition that heavy and habitual drinking patterns constitute a significant health risk in ordinary populations. Health problems attendant on drinking seem to be most strongly associated with the heavy and regular consumption of hard liquor.³⁰

Table 10 presents estimates of trends in per capita consumption of distilled spirits in Eastern Europe, the U.S.S.R., and Western Europe. Around 1960, per capita consumption of hard liquor was already estimated to be higher in Warsaw Pact Europe than in Western Europe. By 1980, however, it was estimated to be dramatically higher. Between 1960 and 1980, in fact, Soviet Bloc Europe's pattern of hard spirit use seems to have edged steadily closer to a Soviet norm. (See Table 10A.) Hard liquor, moreover, is today the alcohol of choice in much of Warsaw Pact Europe, as it is in the U.S.S.R. (See table 10B.)

With the possible exception of Romania (where as recently as 1985 officials insisted that "alcohol consumption is not considered to be giving rise to serious health, social, or economic problems"³¹), authorities throughout Soviet Bloc Europe have been voicing a growing concern about the alcohol habits of the populations beneath them. In expressing their concern, they have also provided details about the scope of the problem. A few illustrative examples may suffice.

In Bulgaria, the incidence of cirrhosis of the liver and related diseases is officially reported to have risen by an order of magnitude between 1974 and 1975. Four times as many women were said to be drinkers in the mid-1980's as in the mid-1970's. A survey in one region by Bulgaria's Communist Youth League concluded that almost 80 percent of the 18 to 30 year olds included were regular drinkers. And while such language does not lend itself to precise calibrations, one Bulgarian health official recently told a Western reporter that every third person in the capital city of Sofia has a "drinking problem."³²

In Czechoslovakia, according to Radio Prague, about 30 to 40 percent of the adult male population in industrial areas today drinks "excessively." In 1987, a leading Czech paper reported that the number of female alcoholics in the country had tripled over the previous decade.³³

In East Germany, the official medical journal *Deine Gesundheit* declared in 1987 that alcohol consumption in the country had as-

²⁸ See, for example, *Sixth Special Report to the Congress on Alcohol and Health From the Secretary of Health and Human Services, January 1987* (Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1987).

²⁹ J. de Lint, "Alcohol Consumption and Liver Cirrhosis Mortality: The Netherlands, 1950-1978," *Journal of Studies on Alcohol* 42, No. 1, 1981.

³⁰ See *Sixth Special Report, op. cit.*

³¹ World Health Organization, *Alcohol Policies in National Health and Development Planning* (Geneva: WHO, 1985), p. 85.

³² Radio Free Europe/Radio Liberty, "Alcoholism in Eastern Europe," RAD Background Report/130, July 30, 1987.

³³ "Drinking of Pregnant Women Triples," *Lidova Demo Kracia*, May 1, 1987.

sumed "alarming proportions." As of the mid-1980's, according to another publication, the life expectancy of the country's alcoholics was "10 to 12 years less than the average." According to an internal 1983 East German Ministry of Health report that was subsequently published in West Germany, 1 person in 12 in the GDR was deemed to be a heavy drinker, a third of these being termed untreatable alcoholics.³⁴

In Hungary, according to discussion in the National Assembly in 1986, about half a million persons were alcoholics; that would have been over 6 percent of the population 15 years of age or older. In 1987, a study published in the magazine of Hungary's Communist Youth League reported that among people aged 31 to 40, about a fifth of all women and almost three-quarters of all men were "heavy drinkers." (By way of comparison, a 1985 study rated 19 percent of men and 9 percent of women of age 31 to 40 as "heavier drinkers" in the United States.³⁵) Feminization of alcoholism seems to be proceeding apace; Hungary's mortality statistics, which are perhaps the most detailed and reliable in Eastern Europe, place the standardized death rate for cirrhosis at a higher level for women in the early 1980's than for men in the mid-1960's.³⁶ Recently, Hungarian authorities have reported some successes in controlling public drunkenness: in 1987, a spot breathalyzer check of 17,000 workers showed that only 2.2 percent of them were drunk on the job. As recently as 1985, the corresponding figure had been over 9 percent.³⁷

In Poland, the Government estimates that about 1 million persons are "regular alcoholics;" this would be about 4 percent of the population 15 years of age or older. For a variety of reasons, household budget surveys in centrally planned economies are of limited utility under even the best of circumstances; it is worth noting, nonetheless, that Warsaw's Main Office of Statistics reported that the portion of total personal consumption expenditures allocated to alcohol exceeded 17 percent in 1983.³⁸ Although the Polish Government has attempted to curtail alcohol consumption since its dissolution of the Solidarity Union and its declaration of martial law in 1981, its measures do not appear to have been tremendously effective. One reason may be that the Polish state has a very real financial stake in heavy drinking amongst the local population. Like all Warsaw Pact governments, Poland derives a considerable portion of its state revenues from the sale of alcoholic beverages through the state liquor monopoly. In 1985, such sales accounted for 18 percent of overall state revenue in Poland.³⁹

³⁴ "Alcoholism in Eastern Europe," *loc. cit.*

³⁵ *Sixth Special Report, loc. cit.* As an earlier report cautions: "When the terms 'alcoholic,' 'alcohol abuse,' or 'problem drinker' are used to designate an alcohol abuser, it must be kept in mind that these terms are somewhat less than precise." *Fifth Special Report to the U.S. Congress on Alcohol and Health from the Secretary of Health and Human Services, December 1983* (Washington, DC: U.S. Department of Health and Human Services, 1983), p. xii.

³⁶ P.A. Compton, "Rising Mortality in Hungary," *Population Studies* 39, No. 1, (1985), pp. 77, 79.

³⁷ *Nepszava*, Apr. 10, 1987, translated in JPRS, Series EER, No. 87-119 (Aug. 3, 1987), pp. 103-104.

³⁸ PAP, Aug. 4, 1987, in English; M. Litmanowicz, "Consumption of Alcoholic Beverages," *Wiadomości Statystyczne*, No. 5, (May 1985), translated in JPRS, Series EPS, No. 85-098 (Sept. 27, 1985).

³⁹ "Alcoholism in Eastern Europe," *loc. cit.*

(C) HEALTH CARE

Properly framed and implemented, national health policies can control and reduce mortality levels for national populations, even during periods of increased health risks (be these self-inflicted or otherwise). Eastern European health policies, however, have not been adequate to this task. The secular rise in mortality levels for Eastern Europe's adult population over the past two decades attests precisely to the dimensions of health policy failure in the region.

A striking pattern has emerged in recent years for Eastern European health services. The number of medical personnel per 10,000 local population has risen rapidly in the region in recent decades—indeed, a good deal more rapidly than in Western Europe. At the same time, overall mortality levels for Eastern European adults has been rising. On the basis of strict, epidemiological reasoning, one might well be led to wonder whether Eastern Europe's doctors are hazardous to the health. (See Table 11.)

The negative correlation between availability of medical personnel and adult mortality levels in Eastern Europe over the past generation may speak to underlying problems in the medical and health strategies embraced and pursued by local regimes. In varying degree, Eastern Europe's medical systems are replicas of the Soviet original. The Soviet health system was originally established to deal with the health problems of a population with a life expectancy roughly the same as that estimated for Ethiopia today. It emphasized mass campaigns to control communicable and infectious diseases and made extensive use of personnel with only brief exposure to medical or public health training. The patterns of disease in modern industrial societies, however, differ dramatically from that encountered by Soviet revolutionaries when they were establishing their socialized health service. More intensive training and dramatically more expensive procedures and equipment are typically required to treat the diseases that may be expected to afflict a population where life expectancy at birth approaches or exceeds seventy years. Soviet-style health systems, unfortunately, have not fully adjusted to this reality. On the contrary: rising mortality in Eastern Europe testifies in some measure to the mismatch of the labor-extensive, low-costs approach of the Soviet health model and the actual needs of the local populations.

One may wonder about the reasons that Soviet-style health systems have failed to respond more effectively to the health problems of the populations they are charged with serving. One factor may be ideological. Soviet doctrine assigns health care and related services to the "nonproductive sphere" of the economy. In times of economic austerity or budgetary stress, there may be pressure to reduce allocations to these supposedly "nonproductive" services. According to official CMEA data, the proportion of public consumption funds allocated to free public health care and related services actually fell in Warsaw Pact Europe between 1965 and 1985. (See Table 12A.) While translating these allocations into a Western-style market-economy framework may present the analyst with serious conceptual problems, attempts to do so have nevertheless been made. One such effort is presented in Table 12B. It suggests a

steadily growing gap between Warsaw Pact Europe and Western Europe in relative allocation of national resources to health care over the past two decades.

Eastern Europe's labor-extensive health strategy, it seems, may not be a complement to an upgrading of health care among state budgetary priorities, but rather a substitute for it. In its Eastern European variant, socialized medicine seems to cut two ways for its patients. As Miskiewicz has noted, "[it] is financed directly and almost entirely by the state; as a result, the quantity and quality of these services are determined by the authorities in the light of political priorities."⁴⁰

V. CONCLUDING REMARKS

To a lesser, but nevertheless unmistakable degree, Eastern Europe is beset by the syndrome of deteriorating conditions of public health that is now officially recognized as afflicting the U.S.S.R. Declining life expectancy at birth, rising levels of adult mortality, and (as some recent Soviet pronouncements suggest⁴¹) an increase of cardiovascular mortality among adults are today common to Yugoslavia, Warsaw Pact Europe, and the U.S.S.R.—and among contemporary industrialized societies, unique to them.

Epidemiological reasoning would prompt profound questions about the impact of governance on health conditions in these areas. The populations affected by rising age-adjusted mortality, after all, have different languages, cultures, and histories. The societies in question vary in material and technical attainment. The most obvious common characteristic of these countries is that they are all ruled by Marxist-Leninist states, and by that particular variant of Marxist-Leninist state that came to power with the direct assistance of the Red Army. After more than two decades of health decline for adult populations in the region, it is perhaps not premature to inquire into whether the health problems evidenced in these countries might be in part systemic. Is there something intrinsic to what historical materialists might term "the mature stage of socialism" that can be understood to have an adverse impact on the health of local populations?

Ordinarily, some correspondence between stated economic progress and health progress in a region may reasonably be expected. For Europe as a whole, however, such a correspondence appears to have broken down in the 1960's. In Western Europe, reduction of mortality has proceeded with economic growth. Indeed, mortality decline has accelerated even as the pace of measured per capita growth has slowed. In Eastern Europe, however, age-adjusted mortality rates have been rising over a period in which substantial increments in economic output have been officially claimed. This dissonance might prompt reassessment of the actual significance of the economic achievements of Eastern European regimes that are currently recorded in official statistical yearbooks. If such a reassessment were to conclude that material progress did indeed occur between the mid-1960's and the mid-1980's, that in itself would

⁴⁰ "Social and Economic Rights in Eastern Europe," *loc. cit.*, p. 49.

⁴¹ Personal Communication, S. Boethig, World Health Organization.

prompt a subsidiary set of questions about the relation between socioeconomic performance and health in Eastern Europe.

In Western countries, medical research today is increasingly concerned with the impact of psychological and emotional factors in health and disease. The "psychosocial" aspect of cardiovascular disease, for example, is currently a topic of serious and active interest on the part of U.S. health authorities.⁴² A number of studies seem to suggest, at least to some researchers, that such intangible factors as attitude, outlook, and satisfaction with life may play a more important role in physical well-being than was previously believed. Jablensky, for example, argues that "there are good reasons to surmise that, owing to methodological difficulties, results reported up to date may be, in fact, an underestimate of the actual contribution of psychological factors to cardiovascular morbidity."⁴³ What further research and improved methodologies will reveal remains to be seen. Such findings, however, may prove to be of particular interest and significance to the apparently increasingly unhealthy populations of Communist Europe.

TABLE 1.—DECLINES IN LIFE EXPECTANCY AT BIRTH IN EASTERN EUROPE AND THE U.S.S.R., SELECTED YEARS 1960-85

| Country | Period | Change in E_0 (years) | Change in male E_0 | Change in female E_0 |
|---------------------------------|----------------------|----------------------------|-------------------------|---------------------------|
| Bulgaria..... | 1970-1980..... | -0.2 | -0.7 | +0.3 |
| Czechoslovakia..... | 1964-1983..... | -1 | -9 | +7 |
| German Democratic Republic..... | 1967/68-1976..... | -1 | -3 | +0 |
| Hungary..... | 1972-1985..... | -6 | -1.8 | +5 |
| Poland..... | 1974-1985..... | -6 | -1.3 | +2 |
| Romania..... | 1976/78-1982/84..... | -1 | -6 | +4 |
| Yugoslavia..... | 1979/80-1984/85..... | -1 | -6 | +4 |
| U.S.S.R..... | 1964/65-1984..... | -2.7 | -3.7 | -1.2 |

Note: E_0 , Life Expectancy at Birth.

Sources: Bulgaria: United Nations, World Population Trends, Population and Development Interrelation and Population Policies: 1983 Monitoring Report Volume 1 (New York: United Nations, 1985). Czechoslovakia: United Nations, Demographic Yearbook 1969 (New York: United Nations, 1970); Statisticka Rocenka 1985 (Prague: Federainy Statisticky Urad, 1985). German Democratic Republic: United Nations, Demographic Yearbook, Special issue, Historical Supplement (New York: U.N. 1979). Hungary: Demografiai Evkonyv 1986 (Budapest: Kozponti Statisztikai Hivatal, 1987). Poland: United Nations, Demographic Yearbook 1986 (New York: U.N. 1988). Romania: Anuarul Statistic al Republicii Socialiste Romania 1986 (Bucharest: Directia Centrala de Statistica, 1987). Yugoslavia: Demografska Statistika 1985 (Belgrade: Savezni Zavod Za Statistiku, 1988). U.S.S.R.: Anatolij Vishnevskiy, "Has the Ice Cracked? Demographic Processes and Social Policy" *Kommunist* (Moscow), No. 6, April 1988, pp. 65-75, translated in Joint Publication Research Service, Series UKO, No. 88-011 (July 11, 1988), p. 44.

TABLE 2.—RECORDED INFANT MORTALITY RATES, EASTERN AND WESTERN EUROPEAN COUNTRIES, 1960-85 (DEATHS PER 1,000 BIRTHS)

| | 1960 | 1965 | 1975 | 1980 | 1985 |
|---|------|------|------|------|------|
| Bulgaria..... | 45 | 31 | 23 | 20 | 15 |
| Czechoslovakia..... | 24 | 26 | 21 | 17 | 15 |
| German Democratic Republic..... | 39 | 25 | 16 | 12 | 9 |
| Hungary..... | 48 | 39 | 33 | 23 | 20 |
| Poland..... | 56 | 42 | 25 | 21 | 18 |
| Romania..... | 77 | 44 | 35 | 29 | 23 |
| Unweighted average, Eastern Europe..... | 48 | 34 | 25 | 20 | 17 |

⁴² See, for example, the recent compilation published through the National Institutes of Health: Adrian M. Ostfeld, Elaine Eaker and T.J. Truss, eds., *Measuring Psychosocial Variables in Epidemiological Studies of Cardiovascular Disease: Proceedings of a Workshop* (Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1985).

⁴³ A. Jablensky, "Mental Health Behavior and Cardiovascular Disease," in *Preventive Cardiology*, loc. cit., p. 571.

TABLE 2.—RECORDED INFANT MORTALITY RATES, EASTERN AND WESTERN EUROPEAN COUNTRIES, 1960-85 (DEATHS PER 1,000 BIRTHS)—Continued

| | 1960 | 1965 | 1975 | 1980 | 1985 |
|--|------|------|------|------|------|
| Unweighted average, 18 Western European countries..... | 31 | 25 | 16 | 12 | 10 |
| Ratio, Eastern Europe to Western Europe | 1.54 | 1.36 | 1.56 | 1.73 | 1.69 |

PERCENTAGE DECLINE IN RECORDED MORTALITY RATES

| | 1960-1965 | 1965-1975 | 1975-1985 | 1960-1985 |
|--|-----------|-----------|-----------|-----------|
| Unweighted average, Eastern Europe | -29 | -26 | -34 | -65 |
| Unweighted average, 18 Western European countries..... | -19 | -35 | -39 | -72 |

Notes: Figures presented only to two places, thus may not add or average due to rounding. Eighteen Western European countries: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, with the following exceptions: 1975 does not include Iceland; 1980 does not include Switzerland; 1985 does not include Iceland or Luxembourg.

Sources: 1960-1980 Eastern Europe, 1960-1985 Western Europe: World Bank, World Tables, Vol. II, 3d and 4th ed. (Washington: World Bank, 1983 and 1987); 1985, Eastern Europe: United Nations, Demographic Yearbook 1986 (New York: U.N. 1988).

TABLE 3.—EXPECTATION OF LIFE AT AGE 1, 1960-85 (YEARS)

| | 1960 | 1965 | 1966 | 1970 | 1975 | 1980 | ¹ 1985 |
|--|------|------|------|------|------|------|-------------------|
| Bulgaria | 71.7 | 72.2 | 72.3 | 72.3 | 71.7 | 71.7 | 71.2 |
| Czechoslovakia | 71.2 | 71.0 | 71.1 | 70.2 | 70.9 | 70.7 | 71.1 |
| German Democratic Republic | 70.7 | 71.3 | 71.4 | 71.0 | 71.4 | 71.2 | 72.2 |
| Hungary | 70.9 | 71.4 | 72.2 | 71.2 | 71.1 | 70.2 | 69.6 |
| Poland | 70.6 | 71.5 | 71.9 | 71.7 | 71.9 | 70.7 | 71.1 |
| Romania | 70.3 | 71.0 | 71.3 | 70.6 | 71.3 | 70.4 | 70.2 |
| Unweighted average, Eastern Europe | 70.9 | 71.4 | 71.7 | 71.2 | 71.4 | 70.8 | 70.9 |
| Unweighted average, 18 Western European countries..... | 71.6 | 71.8 | 71.9 | 72.3 | 72.9 | 73.9 | 74.7 |
| Yugoslavia | 67.2 | 69.9 | 71.1 | 70.3 | 71.1 | 71.2 | 72.0 |
| Unweighted average: Greece, Portugal, Spain | 70.5 | 70.9 | 70.9 | 72.2 | 72.5 | 73.1 | 74.7 |
| Soviet Union | 71.4 | 71.4 | 71.6 | 70.0 | 69.5 | 69.3 | ² 69.8 |

¹ Figures are for 1985 or most recent year available. Eighteen Western European countries: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (England and Wales).

² 1985-86 figure.

Sources: 1960-1980: Jean Bourgeois-Pichat, "Mortality Trends in Industrialized Countries," in Mortality and Health Policy, ed. United Nations (New York: United Nations, 1984). 1985, Eastern Europe: Unpublished life tables prepared by the Census Bureau Center for International Research based on official mortality data by age and sex, 1988. 1985, Western Europe: Council of Europe, Recent Demographic Developments in the Member States of the Council of Europe (Strasbourg: Council of Europe, 1987); and European Economic Community, Demographic Statistics 1988 (Brussels: Statistical Office of the European Community, 1988). 1985, Soviet Union: Naseleniye SSSR 1987 (Moscow: Goskomstat, 1988).

TABLE 4.—LIFE EXPECTANCY AT AGE 30 FOR EASTERN EUROPE, U.S.S.R., AND SELECTED WESTERN EUROPEAN COUNTRIES, MID-1960's AND MID-1980's

| Country | Year | Life Expectancy (years) | | Change (years) | |
|----------------------------------|---------------|-------------------------|--------|----------------|--------|
| | | Male | Female | Male | Female |
| Bulgaria | 1965-67 | 43.06 | 45.99 | | |
| | 1985 | 40.6 | 46.1 | -2.5 | +0.1 |
| Czechoslovakia | 1964 | 41.15 | 45.84 | | |
| | 1984 | 39.50 | 46.27 | -1.7 | +4 |
| German Democratic Republic | 1967-68 | 42.46 | 46.70 | | |
| | 1985 | 41.56 | 46.76 | -9 | +1 |
| Hungary | 1964 | 41.74 | 45.45 | | |
| | 1985 | 38.38 | 45.61 | -3.4 | +2 |
| Poland | 1965-66 | 41.68 | 46.46 | | |
| | 1985 | 39.21 | 46.65 | -2.5 | +2 |
| Romania | 1966 | 42.4 | 45.6 | | |

TABLE 4.—LIFE EXPECTANCY AT AGE 30 FOR EASTERN EUROPE, U.S.S.R., AND SELECTED WESTERN EUROPEAN COUNTRIES, MID-1960's AND MID-1980's—Continued

| Country | Year | Life Expectancy (years) | | Change (years) | |
|--|---------------|-------------------------|--------|----------------|--------|
| | | Male | Female | Male | Female |
| Unweighted average, Eastern Europe | 1985 | 40.2 | 45.3 | -2.2 | -3 |
| | c.1965 | 42.08 | 46.01 | | |
| | c.1985 | 39.91 | 46.12 | -2.2 | +1 |
| Unweighted average, Western Europe ¹ | c.1965 | 42.01 | 46.65 | | |
| | c.1985 | 43.58 | 49.54 | +1.6 | +2.9 |
| | | | | | |
| Additional Comparisons: | | | | | |
| Yugoslavia | 1966 | 42.5 | 46.0 | | |
| | 1980-81 | 41.41 | 46.34 | -1.2 | +3 |
| Selected Southern Europe (Greece, Portugal, Spain) | c.1965 | 42.38 | 46.33 | | |
| | c.1980 | 44.05 | 48.89 | +1.7 | +2.6 |
| German Democratic Republic | 1967-68 | 42.46 | 46.70 | | |
| | 1985 | 41.56 | 46.76 | -9 | +1 |
| Federal Republic of Germany | 1965 | 41.21 | 46.03 | | |
| | 1983-85 | 43.05 | 49.07 | +1.9 | +3.0 |
| | 1965 | | ≈ 45 | | |
| Soviet Union | 1965 | | ≈ 42 | | |
| | 1985 | | | | |

¹ Western Europe: Austria, Denmark, Finland, France, Federal Republic of Germany, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom (England and Wales).

² Figure for both sexes.

Sources: Soviet Union: 1965, Narodnoye Khozyaystvo SSSR v. 1965 g. (Moscow: Moskva Tsentralnoe Pri Sovete Ministrov U.S.S.R., 1966); 1985, Vestnik Statistiki, No. 3, 1987, p. 79. Bulgaria (1985), Rumania (1985), Yugoslavia (1965): Unpublished life tables prepared by U.S. Census Bureau, Center for International Research from official data on population and mortality by age and sex, 1988. All other data: United Nations, Demographic Yearbook, various years (New York: United Nations, various years).

TABLE 5.—CHANGES IN AGE SPECIFIC MORTALITY RATES FOR ADULTS: EASTERN EUROPE, 1965-C. 1985 (PERCENT)

| Country | Age | | | | | | | | |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|
| | 30-34 | 35-39 | 40-49 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 |
| Bulgaria 1965-85: | | | | | | | | | |
| Males | +25 | +38 | +48 | +67 | +45 | +44 | +29 | +19 | +17 |
| Females | -20 | -14 | -5 | -7 | -6 | +5 | +1 | -7 | -3 |
| Czechoslovakia 1965-84: | | | | | | | | | |
| Males | 0 | +12 | +24 | +44 | +38 | +28 | +17 | +3 | +6 |
| Females | -13 | -15 | -14 | -6 | 0 | +1 | +7 | -3 | -8 |
| German Democratic Republic 1965-85: | | | | | | | | | |
| Males | 0 | -5 | +6 | +14 | +11 | 0 | -6 | -10 | 0 |
| Females | -36 | -25 | -25 | -20 | -13 | -11 | -5 | -13 | -10 |
| Hungary 1965-85: | | | | | | | | | |
| Males | +40 | +69 | +100 | +118 | +79 | +58 | +32 | +12 | +8 |
| Females | +20 | +27 | +26 | +26 | +27 | +14 | +4 | -8 | -11 |
| Poland 1965-84: | | | | | | | | | |
| Males | +14 | +21 | +46 | +56 | +51 | +36 | +21 | +6 | NA |
| Females | -36 | -19 | 0 | -3 | +2 | +1 | -1 | -10 | NA |
| Romania 1965-84: | | | | | | | | | |
| Males | +14 | +28 | +50 | +59 | +35 | +23 | +2 | +1 | 0 |
| Females | -8 | -12 | -8 | -5 | -3 | -7 | -8 | -9 | -14 |
| Unweighted average, Eastern Europe: | | | | | | | | | |
| Males | +16 | +27 | +46 | +60 | +43 | +32 | +16 | +5 | ¹ +6 |
| Females | -16 | -10 | -4 | -3 | +1 | +1 | 0 | -8 | ¹ -9 |
| Yugoslavia 1965-85: | | | | | | | | | |
| Males | -19 | -4 | +5 | +20 | +26 | +13 | +3 | -7 | -4 |
| Females | -53 | -37 | -21 | -19 | -17 | -13 | -15 | -23 | 18 |

NA Not available.

¹ Unweighted average for countries with available data.

Sources: Yugoslavia: Compiled by U.S. Census Bureau Center for International Research from Demografska Statistika (Belgrade), various issues. Other data: United Nations, Demographic Yearbook 1974 (New York: United Nations, 1975); United Nations, Demographic Yearbook 1986 (New York: United Nations, 1988).

TABLE 6.—CHANGES IN AGE SPECIFIC MORTALITY RATES FOR ADULTS: GERMAN DEMOCRATIC REPUBLIC AND FEDERAL REPUBLIC OF GERMANY; 1965–85 (percent)

| Country | Age | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 30–34 | 35–39 | 40–44 | 45–49 | 50–54 | 55–59 | 60–64 | 65–69 | 70–74 |
| German Democratic Republic: | | | | | | | | | |
| Males..... | 0 | -5 | +6 | +14 | +11 | 0 | -6 | -10 | 0 |
| Females..... | -36 | -25 | -25 | -20 | -13 | -11 | -5 | -13 | -10 |
| Federal Republic of Germany: | | | | | | | | | |
| Males..... | -28 | -26 | -17 | -9 | -14 | -20 | -25 | -26 | -18 |
| Females..... | -40 | -33 | -35 | -29 | -28 | -25 | -31 | -34 | -34 |
| Difference (German Democratic Republic minus Federal Republic of Germany): | | | | | | | | | |
| Males..... | +28 | +21 | +23 | +23 | +25 | +20 | +19 | +16 | +18 |
| Females..... | +4 | +8 | +10 | +9 | +15 | +14 | +26 | +21 | +24 |

Sources: United Nations, Demographic Yearbook 1967, 1974, and 1986 (New York: United Nations, 1968, 1975, and 1988, respectively).

TABLE 7.—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: EASTERN AND WESTERN EUROPE, C. 1985 (EUROPEAN MODEL)

| Cause of death | Death rate per 100,000 | | Absolute difference (East-West) | Relative difference (West = 100) | Cause as proportion of difference: percent |
|---|--------------------------------|----------------|---------------------------------|----------------------------------|--|
| | Eastern Europe | Western Europe | | | |
| All causes: | | | | | |
| Male..... | 1,507.1 | 1,110.0 | 397.1 | 136 | ..... |
| Female..... | 960.5 | 665.2 | 295.3 | 144 | ..... |
| Infectious and parasitic..... | 10.7 | 8.4 | 2.3 | 127 | 1 |
| | 4.5 | 4.6 | -0.1 | 98 | -1 |
| Malignant neoplasms..... | 260.2 | 261.8 | -1.6 | 99 | -1 |
| | 149.5 | 154.1 | -4.6 | 97 | -2 |
| Neoplasms of trachea, bronchus, lung..... | 80.1 | 74.1 | 6.0 | 108 | 2 |
| | 11.2 | 13.5 | -2.3 | 83 | -1 |
| Circulatory system..... | 801.3 | 500.1 | 301.2 | 160 | 76 |
| | 573.6 | 310.6 | 263.0 | 185 | 89 |
| Ischaemic heart disease..... | 315.5 | 243.3 | 72.2 | 130 | 18 |
| | 149.2 | 108.4 | 40.8 | 138 | 14 |
| Respiratory system..... | 124.7 | 96.6 | 28.1 | 129 | 7 |
| | 59.7 | 47.5 | 12.2 | 126 | 4 |
| Digestive system..... | ¹ 68.4 | 46.1 | 22.3 | 148 | 7 |
| | ¹ 33.0 | 25.3 | 7.7 | 130 | 3 |
| Liver disease, cirrhosis..... | 35.6 | 21.7 | 13.9 | 164 | 4 |
| | 13.6 | 8.0 | 5.6 | 170 | 2 |
| Injury, poisoning..... | ¹ 120.7 | 81.5 | 39.2 | 148 | 10 |
| | ¹ 45.0 | 34.0 | 11.0 | 132 | 4 |
| Traffic accidents..... | ² 20.0 | 22.7 | -2.7 | 88 | -1 |
| | ² 5.8 | 7.2 | -1.4 | 81 | -1 |
| Suicide..... | ¹ ² 36.9 | 22.6 | 14.3 | 163 | 4 |
| | ¹ ² 11.3 | 8.9 | 2.4 | 127 | 1 |

¹ Figure does not include GDR.

² Figure does not include Romania.

Notes: "Age Standardized Death Rates (European Model)" refers to the application of age specific death rates to "European Model" population structure used by the World Health Organization. Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania. Western Europe: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (England and Wales).

Source: Derived from World Health Organization, World Health Statistics Annual 1987 (Geneva: WHO, 1987).

TABLE 7 (B).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: GERMAN DEMOCRATIC REPUBLIC AND FEDERAL REPUBLIC OF GERMANY, C. 1985 (EUROPEAN MODEL)

| Cause of death | Death rate per 100,000 | | Absolute difference (GDR-FRG) | Relative difference (FRG-100) | Cause as proportion of difference: Percent |
|---|------------------------|---------|-------------------------------|-------------------------------|--|
| | GDR | FRG | | | |
| All causes: | | | | | |
| Male..... | 1,399.9 | 1,136.6 | 263.3 | 123 | |
| Female..... | 905.9 | 673.8 | 232.1 | 134 | |
| Infectious and parasitic..... | 6.2 | 8.8 | -2.6 | 70 | -1 |
| | 3.4 | 4.8 | -1.4 | 71 | -1 |
| Malignant neoplasms..... | 243.3 | 275.0 | -31.7 | 88 | -12 |
| Neoplasms of trachea, bronchus, lung..... | 148.7 | 166.5 | -17.8 | 89 | -8 |
| | 75.1 | 72.5 | 2.6 | 104 | 1 |
| | 8.2 | 10.6 | -2.4 | 77 | -1 |
| Circulatory system..... | 751.8 | 528.8 | 223.0 | 142 | 85 |
| Ischaemic heart disease..... | 534.9 | 326.9 | 208.0 | 164 | 90 |
| | 226.0 | 242.3 | -16.3 | 93 | -6 |
| | 109.0 | 107.5 | 1.5 | 101 | 1 |
| Respiratory system..... | 115.4 | 91.0 | 24.4 | 127 | 9 |
| | 41.3 | 35.1 | 6.2 | 118 | 3 |
| Digestive system..... | NA | 56.0 | | | |
| | NA | 29.6 | | | |
| Liver disease, cirrhosis..... | 23.2 | 29.9 | -6.7 | 78 | -3 |
| | 9.0 | 11.4 | -2.4 | 79 | -1 |
| Injury, poisoning..... | NA | 67.1 | | | |
| | NA | 31.4 | | | |
| Traffic accidents..... | 15.5 | 18.7 | -3.2 | 83 | -1 |
| | 5.2 | 6.7 | -1.5 | 78 | -1 |
| Suicide..... | NA | 25.1 | | | |
| | NA | 10.1 | | | |

NA: Not available.

Source: Derived from World Health Organization, World Health Statistics Annual 1987 (Geneva: WHO, 1987).

TABLE 7 (C).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: YUGOSLAVIA AND SELECTED SOUTHERN EUROPEAN COUNTRIES (PORTUGAL, GREECE, SPAIN), C. 1985 (EUROPEAN MODEL)

| Cause of Death | Death rate per 100,000 | | Absolute difference (Yug.-S. Eur.) | Relative difference (S. Eur.-100) | Cause as proportion of difference: Percent |
|---|------------------------|-----------------|------------------------------------|-----------------------------------|--|
| | Yugoslavia | Southern Europe | | | |
| All causes: | | | | | |
| Male..... | 1,439.6 | 1,058.6 | 381.0 | 136 | |
| Female..... | 978.8 | 683.7 | 295.1 | 143 | |
| Infectious and parasitic..... | 22.1 | 11.9 | 10.2 | 186 | 3 |
| | 13.0 | 5.6 | 7.4 | 232 | 3 |
| Malignant neoplasms..... | 213.7 | 214.7 | -1.0 | 100 | -1 |
| Neoplasms of trachea, bronchus, lung..... | 122.6 | 118.4 | 4.2 | 104 | 1 |
| | 60.6 | 53.3 | 7.3 | 114 | 2 |
| | 9.3 | 7.3 | 2.0 | 127 | 1 |
| Circulatory system..... | 713.7 | 444.8 | 268.9 | 160 | 71 |
| Ischaemic heart disease..... | 559.3 | 331.7 | 227.6 | 169 | 77 |
| | 119.3 | 117.3 | 2.0 | 102 | 1 |
| | 56.8 | 52.6 | 4.2 | 108 | 1 |
| Respiratory system..... | 101.3 | 87.4 | 13.9 | 116 | 4 |
| | 60.5 | 45.5 | 15.0 | 133 | 5 |
| Digestive system..... | 73.6 | 59.8 | 13.8 | 123 | 4 |
| | 31.7 | 26.5 | 5.2 | 120 | 2 |
| Liver disease, cirrhosis..... | 44.5 | 33.1 | 11.4 | 134 | 3 |
| | 14.8 | 11.1 | 3.7 | 133 | 1 |
| Injury, poisoning..... | 97.6 | 79.6 | 18.0 | 123 | 5 |
| | 34.3 | 27.7 | 6.6 | 124 | 2 |

TABLE 7 (C).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: YUGOSLAVIA AND SELECTED SOUTHERN EUROPEAN COUNTRIES (PORTUGAL, GREECE, SPAIN), C. 1985 (EUROPEAN MODEL)—Continued

| Cause of Death | Death rate per 100,000 | | Absolute difference (Yug.-S. Eur.) | Relative difference (S. Eur.-100) | Cause as proportion of difference: Percent |
|------------------------|------------------------|-----------------|------------------------------------|-----------------------------------|--|
| | Yugoslavia | Southern Europe | | | |
| Traffic accidents..... | 32.3 | 31.8 | 0.5 | 102 | 1 |
| | 8.4 | 9.0 | -0.6 | 93 | -1 |
| Suicide..... | 26.1 | 9.4 | 16.7 | 278 | 4 |
| | 10.1 | 3.2 | 6.9 | 316 | 2 |

Source: Yugoslavia: World Health Organization, World Health Statistics Annual 1986 (Geneva: WHO, 1986). Other figures: Derived from World Health Organization, World Health Statistics Annual 1987 (Geneva: WHO, 1987).

TABLE 8.—AGE STANDARDIZED DEATH RATES FOR SELECTED CASES: EASTERN AND WESTERN EUROPE, 1955-59 to 1975-79 (EUROPEAN MODEL)

(Death rates per 100,000)

| All Causes | 1955-59 | | 1965-69 | | 1975-79 | |
|---|---------|---------|---------|--------|---------|--------|
| | Male | Female | Male | Female | Male | Female |
| Eastern Europe ¹ | 1,471.1 | 1,136.2 | 1,389.3 | 975.7 | 1,442.1 | 965.9 |
| Western Europe ² | 1,400.8 | 1,030.4 | 1,344.9 | 903.2 | 1,238.0 | 761.2 |
| Absolute difference (East-West)..... | 70.3 | 105.8 | 44.4 | 72.5 | 204.1 | 204.7 |
| Relative difference (West=100)..... | 105.0 | 110.0 | 103.0 | 108.0 | 116.0 | 127.0 |
| Circulatory system: | | | | | | |
| Eastern Europe..... | 603.2 | 525.9 | 621.2 | 500.7 | 719.8 | 544.2 |
| Western Europe..... | 589.3 | 468.0 | 601.9 | 425.7 | 566.5 | 360.9 |
| Absolute difference..... | 13.9 | 57.9 | 19.3 | 75.0 | 153.3 | 183.3 |
| Relative difference..... | 102.0 | 112.0 | 103.0 | 118.0 | 127.0 | 151.0 |
| Cause as proportion of difference: Percent..... | 20.0 | 55.0 | 43.0 | 103.0 | 75.0 | 90.0 |
| Respiratory system: | | | | | | |
| Eastern Europe..... | 147.9 | 101.1 | 132.9 | 74.7 | 144.3 | 75.0 |
| Western Europe..... | 119.0 | 76.8 | 121.1 | 68.6 | 109.9 | 54.9 |
| Absolute difference..... | 28.9 | 24.3 | 11.8 | 6.1 | 34.4 | 20.1 |
| Relative difference..... | 124.0 | 132.0 | 110.0 | 109.0 | 131.0 | 137.0 |
| Cause of proportion of difference; Percent..... | 41.0 | 23.0 | 27.0 | 8.0 | 17.0 | 10.0 |
| Injury and poisoning: | | | | | | |
| Eastern Europe..... | 108.0 | 43.6 | 106.2 | 41.0 | 117.8 | 45.2 |
| Western Europe..... | 94.3 | 39.3 | 97.6 | 41.2 | 93.4 | 41.1 |
| Absolute difference..... | 13.7 | 4.3 | 8.6 | -0.2 | 24.4 | 4.1 |
| Relative difference..... | 115.0 | 111.0 | 109.0 | 100.0 | 126.0 | 110.0 |
| Cause as proportion of difference: Percent..... | 19.0 | 4.0 | 19.0 | 0 | 12.0 | 2.0 |

¹ Eastern Europe: 1955-59 figures for Czechoslovakia and Hungary; 1965-69 figures for Bulgaria, Czechoslovakia, Hungary, and Poland; 1975-79 figures for Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, and Romania.

² Western Europe: Figures for Austria, Belgium, Denmark, Finland, Federal Republic of Germany, France, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (England and Wales) with the following exceptions: 1955-59 figures do not include Greece, Iceland, or Luxembourg; 1965-69 and 1975-79 figures do not include Italy.

Notes: See Table 7 for definition of "Age Standardized Death Rates (European Model)."

Source: For all table 8; derived from World Health Organization, World Health Statistics Annual 1988 (Geneva: WHO, forthcoming).

TABLE 8(B).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: GERMAN DEMOCRATIC REPUBLIC AND FEDERAL REPUBLIC OF GERMANY, 1975-79 ¹

(European Model)

| All causes | Death rates per 100,000 | |
|------------------------------------|-------------------------|--------|
| | Male | Female |
| German Democratic Republic..... | 1,426.6 | 956.5 |
| Federal Republic of Germany..... | 1,346.6 | 828.4 |
| Absolute difference (GDR-FRG)..... | 80.0 | 128.1 |

TABLE 8(B).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: GERMAN DEMOCRATIC REPUBLIC AND FEDERAL REPUBLIC OF GERMANY, 1975-79 ¹—Continued

[European Model]

| All causes | Death rates per 100,000 | |
|--|-------------------------|--------|
| | Male | Female |
| Relative difference (FRG = 100) | 106.0 | 115.0 |
| Circulatory system: | | |
| German Democratic Republic | 741.0 | 551.8 |
| Federal Republic of Germany..... | 608.8 | 394.9 |
| Absolute difference..... | 132.2 | 156.9 |
| Relative difference..... | 122.0 | 140.0 |
| Cause as proportion of difference (percent)..... | 165.0 | 122.0 |
| Respiratory system: | | |
| German Democratic Republic | 127.1 | 42.3 |
| Federal Republic of Germany..... | 101.6 | 39.2 |
| Absolute difference..... | 25.5 | 3.1 |
| Relative difference..... | 125.0 | 108.0 |
| Cause as proportion of difference (percent)..... | 32.0 | 3.0 |

¹ Earlier data and "Injury and Poisoning" data for GDR are not available.TABLE 8(C).—AGE STANDARDIZED DEATH RATES FOR SELECTED CAUSES: YUGOSLAVIA AND SELECTED SOUTHERN EUROPEAN COUNTRIES (GREECE, PORTUGAL, SPAIN), 1965-69 to 1975-79 ¹

[European Model]

| All causes | (Death Rate per 100,000) | | | |
|--|--------------------------|---------|---------|--------|
| | 1965-69 | | 1975-79 | |
| | Male | Female | Male | Female |
| Yugoslavia..... | 1,407.5 | 1,081.2 | 1,346.9 | 958.3 |
| Southern European..... | 1,333.3 | 955.2 | 1,246.8 | 816.3 |
| Absolute difference: | | | | |
| (Yugoslavia-Southern European) | 74.2 | 126.0 | 100.1 | 142.0 |
| Relative difference: | | | | |
| (Southern European = 100) | 106.0 | 113.0 | 108.0 | 117.0 |
| Circulatory system: | | | | |
| Yugoslavia..... | 463.1 | 398.6 | 594.0 | 486.6 |
| Southern European..... | 460.1 | 372.4 | 501.4 | 367.9 |
| Absolute difference..... | 3.0 | 26.2 | 92.6 | 118.7 |
| Relative difference..... | 101.0 | 107.0 | 118.0 | 132.0 |
| Cause as proportion of difference (percent)..... | 4.0 | 21.0 | 93.0 | 84.0 |
| Respiratory system: | | | | |
| Yugoslavia..... | 87.6 | 60.4 | 86.2 | 52.8 |
| Southern European..... | 143.4 | 91.8 | 123.1 | 67.7 |
| Absolute difference..... | -55.8 | -31.4 | -36.9 | -14.9 |
| Relative difference..... | 61.0 | 66.0 | 70.0 | 78.0 |
| Cause as proportion of difference (percent)..... | -75.0 | -25.0 | -37.0 | -10.0 |
| Injury and poisoning: | | | | |
| Yugoslavia..... | 96.5 | 31.4 | 105.2 | 35.4 |
| Southern European..... | 76.6 | 27.3 | 85.7 | 30.4 |
| Absolute difference..... | 19.9 | 4.1 | 19.5 | 5.0 |
| Relative difference..... | 126.0 | 115.0 | 123.0 | 116.0 |
| Cause as proportion of difference (percent)..... | 27.0 | 3.0 | 19.0 | 4.0 |

¹ 1955-59 data are not available.

TABLE 9.—ESTIMATED ANNUAL CIGARETTE CONSUMPTION PER PERSON 15 YEARS OF AGE OR OLDER: EASTERN AND WESTERN EUROPEAN COUNTRIES, 1960-87

| Country | 1965 | 1970 | 1975 | 1980 | 1985 | 1987 ¹ |
|---|-------|-------|-------|-------|-------|-------------------|
| Bulgaria | 1,431 | 1,494 | 1,944 | 1,855 | 2,366 | 2,225 |
| Czechoslovakia | 1,827 | 1,853 | 2,024 | 2,059 | 2,350 | 2,295 |
| German Democratic Republic | 1,473 | 1,574 | 2,039 | 2,291 | 2,397 | 2,350 |
| Hungary | 2,371 | 2,745 | 3,070 | 3,388 | 3,198 | 3,160 |
| Poland | 2,458 | 2,899 | 3,245 | 3,489 | 3,294 | 3,548 |
| Romania | 1,641 | 1,723 | 1,889 | 2,079 | 2,085 | 1,993 |
| Unweighted average, Eastern Europe | 1,867 | 2,048 | 2,369 | 2,527 | 2,615 | 2,595 |
| Yugoslavia | 1,911 | 2,292 | 2,556 | 3,251 | 3,115 | 3,155 |
| Unweighted average, Western Europe ² | 1,813 | 2,172 | 2,324 | 2,357 | 2,292 | 2,239 |

¹ Preliminary data.

² Western Europe: France, Federal Republic of Germany, Greece, Italy, Norway, United Kingdom.

Source: U.S. Department of Agriculture Databank, 1988.

TABLE 10.—ESTIMATED PER CAPITA CONSUMPTION OF DISTILLED SPIRITS: EASTERN EUROPE, U.S.S.R., AND WESTERN EUROPE 1960-80 [LITERS OF PURE ALCOHOL]

| Country | 1960 | 1970 | 1980 |
|---|-------|-------|--------------------|
| Bulgaria | 0.8 | 1.9 | 2.0 |
| Czechoslovakia | 1.1 | 2.5 | 3.5 |
| German Democratic Republic | 1.4 | 2.5 | 4.3 |
| Hungary | 1.4 | 2.8 | 4.3 |
| Poland | 2.4 | 3.1 | 5.9 |
| Romania | 1.1 | 2.4 | 2.2 |
| Unweighted average, Eastern Europe | 1.4 | 2.5 | 3.7 |
| Index (1960 = 100) | 100.0 | 183.0 | ¹ 271.0 |
| U.S.S.R. | 4.7 | 6.2 | 6.8 |
| Index (1960 = 100) | 100.0 | 131.0 | 144.0 |
| Unweighted average, 9 NATO Europe countries | 1.2 | 1.8 | 2.2 |
| Index (1960 = 100) | 100.0 | 153.0 | 187.0 |

¹ 1979.

Sources: M. Harvey Brenner, "International Trends in Alcohol Consumption and Related Pathologies," in *Alcohol and Health Monograph No. 1*, ed. National Institute on Alcohol and Alcoholism (Washington: Department of Health and Human Services, 1981); Werner K. Lebach, "Continental Europe," in *Alcoholic Liver Disease: Pathology, Epidemiology and Clinical Aspects*, ed. Pauline Hall (New York: John Wiley and Sons, 1985); Vladimir Tremf, *Alcohol in the USSR: A Statistical Study* (Durham: Duke Press Policy Studies, 1982).

TABLE 10(B).—COUNTRIES WHERE DISTILLED SPIRITS ACCOUNT FOR MORE THAN ONE-THIRD OF TOTAL CONSUMPTION OF ALCOHOL

| Country | 1980, percentage of consumption |
|---------------------------------|---------------------------------|
| Poland | 69.0 |
| Soviet Union ¹ | 59.7 |
| Iceland | 57.7 |
| Sweden | 48.2 |
| East Germany | 46.4 |
| Finland | 43.6 |
| Hungary | 39.1 |
| Czechoslovakia | 36.4 |

¹ 1979.

Sources: Europe: Werner L. Lebach, "Continental Europe," in *Alcoholic Liver Disease: Pathology, Epidemiology and Clinical Aspects* (New York: John Wiley and Sons, 1985); USSR: Vladimir G. Tremf, *Alcohol in the USSR: A Statistical Study* (Durham: Duke Press Policy Studies, 1982).

TABLE 11.—MEDICAL PERSONNEL PER 10,000 POPULATION, EASTERN AND WESTERN EUROPE, 1960–80

| Country | 1960 | 1970 | 1980 | 1985 |
|---|-------|-------|-------------------|------|
| Bulgaria | 17.0 | 22.2 | 30.0 | 35.1 |
| Czechoslovakia | 17.5 | 22.2 | 30.0 | 36.0 |
| German Democratic Republic | 12.1 | 20.3 | 26.1 | 29.9 |
| Hungary | 15.3 | 22.1 | 28.1 | 31.5 |
| Poland | 12.7 | 19.3 | 22.5 | 24.3 |
| Romania | 13.5 | 14.7 | 17.9 | 20.8 |
| Unweighted average, Eastern Europe ¹ | 14.7 | 20.3 | 26.2 | 29.6 |
| Unweighted average, Western Europe ² | 11.8 | 13.8 | ³ 14.4 | NA |
| Ratio (Western Europe = 100) | 125.0 | 147.0 | 182.0 | NA |
| Yugoslavia | 6.2 | 10.0 | 14.7 | NA |
| Unweighted average: Greece, Portugal, Spain | 10.8 | 12.8 | ³ 24.3 | NA |
| Ratio (Greece, Portugal, Spain = 100) | 57.0 | 78.0 | 60.0 | NA |

¹ Figures for Eastern Europe include doctors and dentists; figures for Western Europe exclude dentists.

² Western Europe: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

³ Figure is for 1981 and does not include Iceland or Luxembourg.

NA: Not available.

Sources: Eastern Europe: Council for Mutual Economic Assistance Secretariat, Statisticheski Exhegodnik Stran—Chlenov Sovietsa Ekonomicheskoi Vzaïmopomoshchi 1987 (Moscow: Finansy i Statistika, 1987).

Western Europe, Yugoslavia: World Bank, World Tables, Vol. 2, 3d ed. (Baltimore: Johns Hopkins University Press, 1983).

TABLE 12.—RESOURCE ALLOCATION TO HEALTH SECTOR BY VARIOUS MEASURES: EASTERN AND WESTERN EUROPE, 1965–85

| | 1965 | 1970 | 1975 | 1980 | 1985 |
|---|------|------|------|------|------------------|
| A. Official estimates of percentage of public consumption funds allocated to free public health and physical education: | | | | | |
| Bulgaria | 14.1 | 13.4 | 14.4 | 16.3 | 16.3 |
| Czechoslovakia | 14.7 | 15.0 | 15.2 | 15.7 | 16.0 |
| German Democratic Republic | 17.7 | 15.3 | 15.8 | 17.9 | 18.8 |
| Hungary | 22.9 | 16.7 | 14.5 | 13.8 | 14.0 |
| Poland | 25.1 | 25.5 | 26.9 | 25.7 | 21.7 |
| (Romania N.A.) | | | | | |
| Unweighted average, Eastern Europe | 18.9 | 17.2 | 17.4 | 17.9 | 17.4 |
| B. Estimates of health sector expenditures as percentage of national output—western national income framework: | | | | | |
| Unweighted average, Eastern Europe ¹ | 3.2 | 3.1 | 3.1 | 3.3 | 3.7 |
| Unweighted average, Western Europe ² | 4.5 | 5.5 | 6.5 | 7.0 | ³ 7.3 |

¹ Percentage of estimated GNP.

² Percentage of GDP; Western Europe: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Norway, Netherlands, Sweden, Switzerland, United Kingdom. 1965 figure does not include Luxembourg, Portugal; 1970 figure does not include Portugal; 1975 figure does not include Iceland; 1983 figure does not include Iceland, Ireland, Luxembourg, Portugal, Spain, Switzerland.

³ 1983 figure.

N.A.: Not available.

Sources: Eastern Europe, Section A: Council for Mutual Economic Assistance Secretariat, Statisticheski Exhegodnik Stran—Chlenov Sovietsa Ekonomicheskoi Vzaïmopomoshchi 1984 and 1987 (Moscow: Finansy i Statistika, 1984 and 1987, respectively). Eastern Europe, Section B: Research Project on National Income in East Central Europe, Eastern Europe: Domestic Final Uses of Gross Product, 1970 and 1975–1985, Occasional Paper No. 92 (New York: L.W. International Financial Research, 1986). Western Europe: OECD, Measuring Health Care 1960–83 (Paris: OECD, 1985); World Bank, World Development Report 1987 (Washington: World Bank, 1987).

TABLE 13.—MORTALITY CHANGE AND OFFICIAL MEASURES OF ECONOMIC CHANGE: EASTERN AND WESTERN EUROPE, 1955–85 [In percent]

| | Period | | |
|--|--------------------|--------------------|-----------------|
| | 1955–59 to 1965–69 | 1965–69 to 1975–79 | 1975–79 to 1985 |
| Warsaw Pack Europe: | | | |
| Age standardized mortality rate (European model) | –9 | +2 | +3 |

TABLE 13.—MORTALITY CHANGE AND OFFICIAL MEASURES OF ECONOMIC CHANGE: EASTERN AND WESTERN EUROPE, 1955-85 [In percent]—Continued

| | Period | | |
|--|-----------------------|-----------------------|--------------------|
| | 1955-59 to 1965-69 | 1965-69 to 1975-79 | 1975-79 to 1985 |
| Per capita net material product produced (unweighted average) ¹ | +73 | +92 | +30 |
| OECD Europe: | | | |
| Age standardized mortality rate (European model) | -8 | -11 | -11 |
| Per capita GNP (weighted average) | +44 | +33 | +11 |

¹ Figures are for 1955-65, 1965-75, and 1975-85, respectively.

Age standardized mortality rates are unweighted arithmetic averages for male and female rates.

Sources: Data derived from the following series: World Health Organization, World Health Statistics Annual (Geneva: WHO); Organization for Economic Cooperation and Development, National Accounts (Paris: OECD); Council for Mutual Economic Assistance Secretariat, Statisticheskii Ezhegodnik Stran-Chlenov Soveta Ekonomicheskoi Vzaïmopomoshchi (Moscow: Finansy i Statistika).

POPULATION ESTIMATES AND PROJECTIONS FOR EASTERN EUROPE: 1950 TO 2010

By Godfrey Baldwin*

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I. SUMMARY

The total population of the eight Communist countries of Eastern Europe grew from 106 million persons in 1950 to almost 138 million in 1985, and it is projected to grow to between 143 million and 155 million by the year 2010. The rate of growth slowed considerably during the period 1950-85 and it is expected to remain low in the future. The birth rate continues to decline while the death rate stays relatively stable. The median age of the population and the number of elderly continue to increase. Albania's population is increasing at a much faster rate than those of the other Eastern European countries.

II. INTRODUCTION

This paper presents population projections, by age and sex, for the eight Communist countries of Eastern Europe—Albania, Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania, and Yugoslavia. Population trends are described very briefly in the first section of the text and the sources, methods, and assumptions employed in making the projections are discussed in the following section. The text tables present the results of the projections in summary form, some derivative data, and figures relating to the fertility and mortality assumptions. Detailed results for the eight countries combined and for each country individually are given in the appendix tables. Table I gives total mid-year population, absolute numbers of births, deaths, and natural increase, and the corresponding rates per 1,000 population for every 5th year of the period 1950 to 2010 and for each year of the period 1980 to 1990. Table II shows the projected distribution of the population by sex in 5-year age groups for every 5th year of the

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period 1985 to 2010. The numbers of persons by sex in the preschool, primary school, working, and retirement ages for every 5th year of the period 1985 to 2010 are given in tables III, IV, V, and VI, respectively.¹

III. POPULATION TRENDS, 1950 TO 2010

The following discussion of population trends in Eastern Europe is very brief. More detailed discussions are given in some of the earlier articles and reports by the U.S. Bureau of the Census.² This section will highlight the population trends and the changes in the current projections compared to those presented previously. The population of the eight countries of Eastern Europe increased by about 32 million between 1950 and 1985. This represents an average annual growth rate of 0.7 percent. (See table 1).

The rate declined during the fifties and early sixties, remained relatively stable from the mid-1960's to the mid-1970's and then declined again in the late seventies and early eighties. Most of the earlier decline was due to a decline in the birth rate. For the region as a whole, the birth rate dropped from about 26 births per 1,000 population in 1950 to 17 per 1,000 in 1965. (See table 2). After 1965 the rate increased slightly to 18 per 1,000 in the mid-1970's and then declined slightly to 16 per 1,000 in the early 1980's. This relatively stable rate is in contrast to the generally falling birth rates in much of Europe after 1965. The higher rate in Eastern Europe has been due, in part, to programs designed to increase fertility which were instituted by the governments of several of these countries.

The crude death rate for Eastern Europe declined from 12 deaths per 1,000 population in 1950 to 9 per 1,000 in the mid-sixties and then increased to 11 per 1,000 in 1985. The increase in the crude death rate has been due to the gradual aging of the population and to increases in the mortality rates for some age groups since the mid-1960's. The trend in the natural increase rate reflects the changes in both the birth rate and the death rate. The natural increase rate for Eastern Europe declined from 14 per 1,000 in 1950 to 8 in 1965; it remained around 7 to 9 per 1,000 until the mid-seventies and then declined to 5 per 1,000 in the mideighties.

According to the projections presented in this report, the population of Eastern Europe is expected to number between 143 million and 155 million by the year 2010. (See table 3.) The principal determinant of the size of the future population will be the trend in fertility. Four fertility trends are postulated for the projections: high, medium, low, and constant. The amount of population growth expected between 1985 and 2010 ranges from an increase of only 5 million persons for the low series to an increase of 17 million for the high series. The medium and constant series imply increments

¹ For this report, these age groups are defined as follows: preschool: ages 0 to 6 years; primary school: ages 7 to 14 years; working: ages 15 to 64 years; and retirement: ages 65 years and over. Actual definitions vary from country to country and in many cases differ from those given here.

² The most recent published projections for these countries by the U.S. Bureau of the Census were presented in Godfrey Baldwin, "Population Estimates and Projections for Eastern Europe: 1950-2000," in U.S. Congress, Joint Economic Committee, "East European Economies: Slow Growth in the 1980's, Volume 1, Economic Performance and Policy," Washington, DC, U.S. Government Printing Office, 1985.

of 11 million and 15 million, respectively. The implied average annual growth rates vary from 0.1 percent for the low series to 0.5 percent for the high series. The rates for the medium and constant series are 0.3 percent and 0.4 percent, respectively. All of these rates are lower than the average annual rate for the 1950-85 period.

Migration after 1985 was assumed to be nil for five of the eight countries and it was assumed to decline to zero by 1995 for the other three countries—the German Democratic Republic, Poland, and Romania. The assumed emigration figures for the 10-year period were only 83,000 persons for Poland, 86,000 for Romania, and 113,000 for the German Democratic Republic. Even for these three countries, the projected birth and death rates were the primary determinants of the future growth rates.

The birth, death, and natural increase rates implied by the projections for 1986, 1990, 2000, and 2010 are shown in table 4. The crude birth rate is expected to decline to 15 per 1,000 for the high and constant series, to 13 per 1,000 for the medium series, and to 11 per 1,000 for the low series. The crude death rate for all four series is expected to remain around 11 per 1,000 throughout the period. These trends result in slightly declining rates of natural increase for the high series and the constant series, moderately declining rates for the medium series, and significantly declining rates for the low series. By the end of the period, the rate for the low series is negative.

The growth rates for most of the eight countries were low to moderate (i.e., 0.4 to 1.2 percent) during the 1950-85 period. (See table 1.) Albania and the German Democratic Republic were the exceptions. Albania's average annual rate of 2.5 percent was more than double that of any of the other countries. The higher rate for Albania was due to a much higher birth rate. Even though the level of fertility has declined in Albania during the last three decades, it is still considerably higher than in the other countries.

The German Democratic Republic was the only country among the eight to have a smaller population in 1985 than in 1950—due primarily to emigration, which was enormous prior to the building of the Berlin Wall in 1961. Since 1950, all of the countries except Albania have experienced at least one period of significant net emigration, but the German Democratic Republic was the only country where migration was the most important factor in population change. Net emigration from that country between 1950 and 1985 amounted to around 2.7 million persons, or about 15 percent of the 1950 population. The German Democratic Republic and Hungary were the only countries to experience a natural decrease during any year after 1950. For the German Democratic Republic the number of deaths exceeded the number of births for every year from 1969 through 1978. The number of births increased after 1978 and was greater than the number of deaths every year through 1985. The number of births in Hungary has declined since the mid-seventies and has been less than the number of deaths since 1981.

The future population trends for the individual countries vary considerably depending on the assumed level of fertility and on the age-sex structure. Albania is expected to have by far the largest relative growth. The medium series projection for that country in-

dicates an average annual growth rate of 1.4 percent between 1985 and 2010, compared to 0.4 percent for Poland, Romania, and Yugoslavia, the countries with the next highest rates. (See table 3.) The medium series rates for the remaining countries vary from -0.1 percent for Hungary to 0.3 percent for Czechoslovakia. In the other series all of the projected rates for the period 1985-2010 except those for Albania are between -0.3 percent and 0.6 percent. The rates for Albania range from 1.3 to 1.9 percent.

The current projections for these countries are generally lower than the previously published projections prepared by the U.S. Bureau of the Census. For Eastern Europe as a whole the total population for the medium series is 2.1 million or 1.4 percent lower at the end of the century, the total for the high series is 2.8 million or 1.9 percent lower, and the figures for the low and constant series are 1.6 million or 1.1 percent lower. For the individual countries all of the projected totals for the year 2000 are lower except those for the low series for Albania and the constant series for Romania, both of which were only slightly higher. The lower figures are due in varying degrees to lower base populations, lower fertility assumptions, higher mortality assumptions, and in some cases, to assumed emigration. Most of the base populations for the new projections were lower than the corresponding figures from the previous projections. In a few cases this factor alone accounted for as much as one-fourth of the total difference in the projected totals for the year 2000.

The lower fertility assumptions contributed to the lower population projections for all of the countries except Romania. This was the most important factor for Albania, Czechoslovakia, the German Democratic Republic, and Yugoslavia. Romania's slightly higher initial fertility offset the slightly lower long-term assumptions so that total births for the 1985-2000 period were not that different for the high, medium, and low series. Births for the constant series were higher and this resulted in higher projected population totals. Based on recent trends, mortality was assumed to remain constant until 1990 before improving for Bulgaria, Hungary, Poland, and Romania. This assumption resulted in greater numbers of deaths and lower population totals for these countries. The differences for Poland were especially large, but this change in the mortality assumption was the most important difference for all four of these countries. In contrast to the no-migration assumption of the previous projections, some emigration was assumed for the current projections for the German Democratic Republic, Poland, and Romania. For these three countries, net emigration was assumed to gradually decline from the estimated 1985 levels to zero by 1995. This assumed emigration also contributed to the smaller projected population totals for these countries.

Selected age-sex characteristics in 1950, 1985, and 2010 are presented in table 5. The age distributions for the latter year vary according to the projection series because the size of the total population and especially the size of the under 15 age group are strongly dependent upon the projected level of fertility. The higher the level of fertility, the higher the proportion of young people and the lower the proportion of old people. Albania, which stands out from the other countries in this respect, has a much younger population,

as is clearly reflected in the percentage distributions by major age groups and in the median ages.

IV. SOURCES, METHODS, AND ASSUMPTIONS

The projections presented here supersede all others for these countries prepared previously by the U.S. Bureau of the Census. The data incorporated in these projections are for the most part those that were available by the spring of 1986, but some later information has been used. The cohort-component method was used in making the projections. This method involves carrying forward a reported or estimated age-sex distribution on the basis of various assumptions concerning the components of population change (i.e., fertility, mortality, and migration).

Whenever possible, official age-sex distributions were used for the base population, but for some countries it was necessary to use estimated or adjusted distributions. The midyear 1972 base population for Albania was derived from data reported for earlier years, including census data for 1955 and 1960. For Bulgaria, the population by single years of age and sex reported for January 1, 1971, was updated to midyear 1984 and adjusted to accord with the average of the distributions by 5-year age groups and sex reported for the beginning and end of 1984. For Yugoslavia, the population by single years of age and sex reported for the 1971 census was updated to midyear 1981 and adjusted to accord with the population by 5-year age groups and sex reported for the latter date. Official distributions by single years of age and sex for the beginning and end of 1984 were averaged to obtain the midyear 1984 base populations for the German Democratic Republic, Hungary, and Poland. The base populations for Czechoslovakia and Romania were the reported distributions by single years of age and sex for midyear 1984. For each country, the base population was survived to midyear 1985 using reported and estimated data on fertility, mortality, migration, and total population for the intervening years.

Four series of projections incorporating alternate fertility assumptions were prepared for each country. The constant series assumes that fertility will remain at the estimated 1985 level throughout the projection period. The other three series were designed to give a reasonable range of possible future trends in fertility. The assumptions for each series were formulated in terms of total fertility rates.³ The rates assumed for 1986 and 2000 are given in table 6. For all of the countries except Albania, the rates for the intervening years were obtained by linear interpolation and the rates after 2000 were assumed to remain constant. For Albania, the rates for the intervening years were assumed to decline according to logistic curves fitted to the assumed values for 1986 and 2000; and the rates between 2000 and 2050 were assumed to decline linearly to the same levels assumed for the other countries in the year 2000. For each country, recently reported or estimated female age-specific fertility rates were adjusted to yield the number of births for 1985. For each series and each year these 1985 age-specific

³ The total fertility rate is the number of children a woman would have in a lifetime if she were to experience the same fertility rates year by year that were experienced by all women in a given year.

ic fertility rates were adjusted proportionally to the level of the assumed total fertility rates.

The anticipated fertility levels are related to the estimated total fertility rates for 1985. For example, the estimated 1985 rate of 3.28 for Albania was very high; consequently, all of the series except the constant series postulate a decline in the total fertility rate by the end of the century. On the other hand, the 1985 rate for the German Democratic Republic of 1.75 was low; therefore, increases are assumed for the high and medium series and only a small decline is assumed for the low series. The 1985 rates for the other six countries were between the rates for the German Democratic Republic and Albania, and the assumed changes in the total fertility rate are also intermediate between the two extremes.

For all of the countries except Albania, the total fertility rate was assumed to reach a level of 2.2 for the high series, 1.9 for the medium series, and 1.6 for the low series by the end of the century. The assumed level for the high series is a little lower than the 1985 levels for Poland and Romania; the level for the low series is a little lower than the 1985 level and equal to the mid-1970's level for the German Democratic Republic; and the assumed level for the medium series is such that, given the low mortality levels, it would eventually result in a slow rate of population decline if it continued for an extended length of time. The assumed total fertility rates for Albania for the year 2000 were 2.4, 2.2, and 2.0 for the high, medium, and low series, respectively. The rates for Albania were assumed to continue to decline after the turn of the century until they reached the levels of the other Eastern European countries in the year 2050.

For each country, only one assumption was made about the future course of mortality. Bulgaria, Hungary, Poland, and Romania have experienced stagnate or increasing mortality rates during recent years; therefore, it was assumed that mortality levels for these countries would remain unchanged until 1990 and then improve. For the other four countries, it was assumed that mortality would improve throughout the projection period. The mortality levels for all eight countries were assumed to converge to a common level by the middle of the next century. For the 1985-2010 period, the average increase in life expectancy for the eight countries was 2.7 years or a rate of slightly more than 0.1 year per year. The average increase for males, 2.9 years, was more than the average increase for females, 2.5 years, because current life expectancies for males are unusually low relative to those for females. Likewise, larger increases were assumed for some countries such as Hungary because the current life expectancies in these countries are low. Overall, these assumptions appear to be reasonable, given the current levels of life expectancy in these countries.

The life table survival rates used for the projections were based on estimated 1985 survival rates calculated from official and estimated mortality data and on the relative changes implied between appropriate levels of model life tables prepared by Coale and Demeny.⁴ The tables are divided into four families, each represent-

⁴ Ansley J. Coale and Paul Demeny, "Regional Model Life Tables and Stable Populations," Princeton, New Jersey, Princeton University Press, 1966.

ing a different pattern of age-specific mortality, based on the mortality experience of various countries of the world. For present purposes, the families selected were those that most closely matched recent empirical mortality patterns by age and sex for each country. For all of the countries except Albania, the empirical patterns were derived from official mortality data by age and sex for one or more of the years from 1980 to 1984. For Albania, a 1977-79 life table estimated for the neighboring Kosovo region of Yugoslavia was used as the mortality pattern since there was not sufficient Albanian data to derive a life table. Ethnic Albanians are the predominant population group for the Kosovo region. For each country the life table derived from empirical mortality data was adjusted to yield the number of deaths by sex for 1985. Survival rates from these adjusted 1985 life then tables were then used as the beginning rates for the mortality projections.

The survival rates for each year of the projection period were calculated by modifying the estimated 1985 survival rates according to the changes implied between appropriate levels of the model life tables (i.e., the levels with life expectancies at birth equal to those estimated for 1985 and those assumed for the year in question). The life expectancies associated with the survival rates for 1985 and 2010 are shown in table 7. Because of adverse mortality trends in recent years, the rates for Bulgaria, Hungary, Poland, and Romania were assumed to remain unchanged until 1990. The rates for the other four countries were assumed to increase throughout the projection period. For each country, logistic curves were used to project the life expectancies for the years after 1985 or after 1990 for Bulgaria, Hungary, Poland, and Romania.

For most of the Eastern European countries migration has not been a significant factor in population change in recent years. However, there continues to be a persistent net emigration of people from the German Democratic Republic, Poland, and Romania. While the annual amounts have not been large the outmigration appears likely to continue for at least the near future. For this reason, it was assumed that emigration for these three countries would gradually decline from the levels estimated for 1985 to zero by 1995. The cumulative total emigration projected for the 10-year period was 113,000 persons for the German Democratic Republic, it was 83,000 persons for Poland, and it was 86,000 for Romania. Migration was assumed to be nil during the projection period for the other countries.

TABLE 1.—TOTAL POPULATION AND AVERAGE ANNUAL GROWTH RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1950-85

[Absolute numbers in thousands as of midyear; figures may not add to totals due to rounding]

| Country | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 | 1985 |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| Eastern Europe | 106,061 | 111,692 | 116,565 | 121,110 | 125,500 | 129,837 | 134,301 | 137,752 |
| Albania | 1,215 | 1,379 | 1,607 | 1,865 | 2,136 | 2,401 | 2,671 | 2,962 |
| Bulgaria | 7,251 | 7,499 | 7,867 | 8,201 | 8,490 | 8,721 | ¹ 8,844 | ¹ 8,944 |
| Czechoslovakia | 12,389 | 13,093 | 13,654 | ¹ 14,147 | ¹ 14,319 | ¹ 14,772 | ¹ 15,255 | 15,500 |
| German Democratic Republic | ² 18,388 | ¹ 17,832 | ¹ 17,058 | 17,020 | ¹ 17,070 | 16,850 | 16,737 | 16,644 |
| Hungary | 9,338 | 9,825 | 9,984 | 10,153 | 10,337 | 10,532 | 10,711 | 10,649 |
| Poland | 24,824 | ¹ 27,221 | ¹ 29,590 | ¹ 31,262 | 32,526 | ¹ 33,969 | ¹ 35,578 | 37,203 |

TABLE 1.—TOTAL POPULATION AND AVERAGE ANNUAL GROWTH RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1950-85—Continued

(Absolute numbers in thousands as of midyear; figures may not add to totals due to rounding)

| Country | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 | 1985 |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Romania..... | 16,311 | 17,325 | 18,403 | 19,027 | 20,253 | 21,245 | 22,201 | 22,727 |
| Yugoslavia..... | 16,346 | 17,519 | 18,402 | 19,434 | 20,371 | 21,347 | 22,304 | 23,123 |

| Country | Average annual growth rate | | | | | | | |
|---------------------------------|----------------------------|---------|---------|---------|---------|---------|---------|---------|
| | 1950-55 | 1955-60 | 1960-65 | 1965-70 | 1970-75 | 1975-80 | 1980-85 | 1950-85 |
| Eastern Europe..... | 1.0 | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.5 | 0.7 |
| Albania..... | 2.5 | 3.1 | 3.0 | 2.7 | 2.3 | 2.1 | 2.1 | 2.5 |
| Bulgaria..... | .7 | 1.0 | .8 | .7 | .5 | .3 | .2 | .6 |
| Czechoslovakia..... | 1.1 | .8 | .7 | .2 | .6 | .6 | .3 | .6 |
| German Democratic Republic..... | -.6 | -.9 | .0 | .1 | -.3 | -.1 | -.1 | -.3 |
| Hungary..... | 1.0 | .3 | .3 | .4 | .4 | .3 | -.1 | .4 |
| Poland..... | 1.8 | 1.7 | 1.1 | .8 | .9 | .9 | .9 | 1.2 |
| Romania..... | 1.2 | 1.2 | .7 | 1.2 | 1.0 | .9 | .5 | .9 |
| Yugoslavia..... | 1.4 | 1.0 | 1.1 | .9 | .9 | .9 | .7 | 1.0 |

¹ Revised estimates to account for discrepancies between the official estimates and census results. See notes to tables I-C, I-D, I-E, I-G, and I-I.

² Census of Aug. 31, 1950.

TABLE 2.—VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1950-85

(Rates per thousand population)

| Rate and year | Eastern Europe | Albania | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia |
|--------------------------|----------------|---------|----------|----------------|----------------------------|---------|--------|---------|------------|
| Birth: | | | | | | | | | |
| 1950..... | 25.5 | 38.9 | 25.2 | 23.3 | 16.5 | 20.9 | 30.7 | 26.2 | 30.2 |
| 1955..... | 24.1 | 44.5 | 20.1 | 20.3 | 16.4 | 21.4 | 29.2 | 25.6 | 26.9 |
| 1960..... | 19.9 | 43.4 | 17.8 | 15.9 | 17.2 | 14.7 | 22.6 | 19.1 | 23.5 |
| 1965..... | 17.1 | 35.2 | 15.3 | 16.4 | 16.5 | 13.1 | 17.5 | 14.6 | 21.0 |
| 1970..... | 17.2 | 32.5 | 16.3 | 16.0 | 13.9 | 14.7 | 16.8 | 21.1 | 17.8 |
| 1975..... | 18.0 | 29.6 | 16.6 | 19.6 | 10.8 | 18.4 | 19.0 | 19.7 | 18.2 |
| 1980..... | 17.2 | 26.5 | 14.5 | 16.3 | 14.6 | 13.9 | 19.5 | 18.0 | 17.1 |
| 1981..... | 16.6 | 26.5 | 14.0 | 15.5 | 14.2 | 13.3 | 18.9 | 17.0 | 16.4 |
| 1982..... | 16.5 | 27.8 | 14.0 | 15.2 | 14.4 | 12.5 | 19.4 | 15.3 | 16.7 |
| 1983..... | 16.1 | 26.0 | 13.8 | 14.9 | 14.0 | 11.9 | 19.7 | 14.3 | 16.4 |
| 1984..... | 16.1 | 27.3 | 13.7 | 14.7 | 13.7 | 11.8 | 18.9 | 15.5 | 16.4 |
| 1985..... | 15.9 | 26.2 | 13.3 | 14.6 | 13.7 | 12.2 | 18.2 | 15.8 | 15.9 |
| Death: | | | | | | | | | |
| 1950..... | 11.9 | 14.2 | 10.2 | 11.5 | 11.9 | 11.4 | 11.6 | 12.4 | 13.0 |
| 1955..... | 10.3 | 15.1 | 9.1 | 9.6 | 12.0 | 10.0 | 9.6 | 9.7 | 11.4 |
| 1960..... | 9.5 | 10.4 | 8.1 | 9.2 | 13.7 | 10.2 | 7.6 | 8.7 | 9.9 |
| 1965..... | 9.3 | 9.0 | 8.2 | 10.0 | 13.5 | 10.6 | 7.4 | 8.6 | 8.8 |
| 1970..... | 10.1 | 9.3 | 9.1 | 11.6 | 14.1 | 11.6 | 8.2 | 9.5 | 8.9 |
| 1975..... | 10.2 | 7.2 | 10.3 | 11.5 | 14.3 | 12.4 | 8.7 | 9.3 | 8.7 |
| 1980..... | 10.9 | 6.4 | 11.1 | 12.2 | 14.2 | 13.6 | 9.8 | 10.4 | 8.8 |
| 1981..... | 10.6 | 6.6 | 10.8 | 11.8 | 13.9 | 13.5 | 9.2 | 10.0 | 9.0 |
| 1982..... | 10.5 | 5.9 | 11.3 | 11.8 | 13.7 | 13.5 | 9.2 | 10.0 | 9.0 |
| 1983..... | 10.8 | 6.1 | 11.5 | 12.1 | 13.3 | 13.9 | 9.6 | 10.4 | 9.6 |
| 1984..... | 10.8 | 5.7 | 11.4 | 11.9 | 13.3 | 13.8 | 9.9 | 10.3 | 9.4 |
| 1985..... | 11.0 | 5.8 | 12.0 | 11.9 | 13.5 | 13.9 | 10.3 | 10.9 | 9.1 |
| Natural increase: | | | | | | | | | |
| 1950..... | 13.6 | 24.7 | 15.0 | 11.7 | 4.6 | 9.5 | 19.1 | 13.8 | 17.3 |
| 1955..... | 13.7 | 29.4 | 11.1 | 10.6 | 4.4 | 11.5 | 19.6 | 15.9 | 15.5 |
| 1960..... | 10.4 | 32.9 | 9.7 | 6.7 | 3.5 | 4.5 | 15.0 | 10.4 | 13.6 |

TABLE 2.—VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1950–85—Continued

[Rates per thousand population]

| Rate and year | Eastern Europe | Albania | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia |
|---------------|------------------|-------------------|----------|----------------|----------------------------|---------|--------|---------|------------|
| 1965..... | 7.8 | 26.2 | 7.2 | 6.4 | 3.0 | 2.5 | 10.0 | 6.0 | 12.2 |
| 1970..... | 7.1 | 23.3 | 7.3 | 4.4 | —2 | 3.1 | 8.6 | 11.5 | 8.9 |
| 1975..... | ¹ 7.7 | ¹ 22.3 | 6.3 | 8.1 | —3.5 | 6.0 | 10.2 | 10.4 | 9.5 |
| 1980..... | 6.3 | 20.1 | 3.4 | 4.1 | .4 | .3 | 9.6 | 7.5 | 8.3 |
| 1981..... | 6.1 | 19.9 | 3.3 | 3.8 | .3 | —2 | 9.7 | 7.0 | 7.5 |
| 1982..... | 5.9 | 21.8 | 2.7 | 3.5 | .7 | —1.0 | 10.1 | 5.3 | 7.8 |
| 1983..... | 5.3 | 19.8 | 2.3 | 2.8 | .7 | —2.0 | 10.2 | 3.9 | 6.8 |
| 1984..... | 5.3 | 21.6 | 2.3 | 2.8 | .4 | —2.0 | 9.1 | 5.2 | 7.1 |
| 1985..... | 4.8 | 20.4 | 1.3 | 2.7 | .1 | —1.6 | 8.0 | 4.9 | 6.8 |

¹ Estimated.

TABLE 3.—ESTIMATED AND PROJECTED TOTAL POPULATION AND AVERAGE ANNUAL GROWTH RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1985–2010

[Absolute numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series]

| Country and series | 1985 ¹ | 1990 | 1995 | 2000 | 2005 | 2010 | Average annual growth rate | | | | | |
|-----------------------------|-------------------|---------|---------|---------|---------|---------|----------------------------|---------|-----------|-----------|-----------|-----------|
| | | | | | | | 1985–90 | 1990–95 | 1995–2000 | 2000–2005 | 2005–2010 | 1985–2010 |
| Eastern Europe: | | | | | | | | | | | | |
| High | 137,755 | 141,147 | 144,578 | 148,296 | 151,846 | 155,078 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 |
| Medium | | 140,561 | 143,023 | 145,404 | 147,398 | 148,915 | .4 | .3 | .3 | .3 | .2 | .3 |
| Low | | 139,975 | 141,467 | 142,511 | 142,956 | 142,813 | .3 | .2 | .1 | .1 | .0 | .1 |
| Constant | | 140,696 | 143,713 | 147,111 | 150,375 | 153,219 | .4 | .4 | .5 | .4 | .4 | .4 |
| Albania: | | | | | | | | | | | | |
| High | 2,963 | 3,287 | 3,595 | 3,867 | 4,117 | 4,369 | 2.1 | 1.8 | 1.5 | 1.3 | 1.2 | 1.6 |
| Medium | | 3,268 | 3,548 | 3,792 | 4,013 | 4,229 | 2.0 | 1.6 | 1.3 | 1.1 | 1.0 | 1.4 |
| Low | | 3,248 | 3,501 | 3,715 | 3,907 | 4,088 | 1.8 | 1.5 | 1.2 | 1.0 | .9 | 1.3 |
| Constant | | 3,287 | 3,645 | 4,019 | 4,398 | 4,787 | 2.1 | 2.1 | 2.0 | 1.8 | 1.7 | 1.9 |
| Bulgaria: | | | | | | | | | | | | |
| High | 8,944 | 9,011 | 9,100 | 9,218 | 9,311 | 9,377 | .1 | .2 | .3 | .2 | .1 | .2 |
| Medium | | 8,978 | 9,009 | 9,046 | 9,045 | 9,008 | .1 | .1 | .1 | .0 | -.1 | .0 |
| Low | | 8,945 | 8,918 | 8,873 | 8,780 | 8,645 | .0 | -.1 | -.1 | -.2 | -.3 | -.1 |
| Constant | | 8,979 | 9,015 | 9,059 | 9,068 | 9,040 | .1 | .1 | .1 | .0 | -.1 | .0 |
| Czechoslovakia: | | | | | | | | | | | | |
| High | 15,500 | 15,757 | 16,080 | 16,533 | 16,966 | 17,324 | .3 | .4 | .6 | .5 | .4 | .4 |
| Medium | | 15,695 | 15,910 | 16,204 | 16,454 | 16,619 | .2 | .3 | .4 | .3 | .2 | .3 |
| Low | | 15,633 | 15,741 | 15,875 | 15,944 | 14,922 | .2 | .1 | .2 | .1 | .0 | .1 |
| Constant | | 15,704 | 15,959 | 16,328 | 16,670 | 16,924 | .3 | .3 | .5 | .4 | .3 | .4 |
| German Democratic Republic: | | | | | | | | | | | | |
| High | 16,649 | 16,642 | 16,709 | 16,840 | 17,027 | 17,208 | .0 | .1 | .2 | .2 | .2 | .1 |
| Medium | | 16,578 | 16,542 | 16,539 | 16,565 | 16,559 | -.1 | .0 | .0 | .0 | .0 | .0 |
| Low | | 16,514 | 16,375 | 16,328 | 16,104 | 15,918 | -.2 | -.2 | -.2 | -.2 | -.2 | -.2 |
| Constant | | 16,566 | 16,487 | 16,415 | 16,353 | 16,254 | -.1 | -.1 | -.1 | -.1 | -.1 | -.1 |
| Hungary: | | | | | | | | | | | | |
| High | 10,649 | 10,582 | 10,577 | 10,677 | 10,776 | 10,831 | -.1 | .0 | .2 | .2 | .1 | .1 |
| Medium | | 10,546 | 10,474 | 10,477 | 10,466 | 10,408 | -.2 | -.1 | .0 | .0 | -.1 | -.1 |
| Low | | 10,509 | 10,372 | 10,278 | 10,158 | 9,989 | -.3 | -.3 | -.2 | -.2 | -.3 | -.3 |
| Constant | | 10,543 | 10,462 | 10,446 | 10,413 | 10,333 | -.2 | -.2 | .0 | -.1 | -.2 | -.1 |

TABLE 3.—ESTIMATED AND PROJECTED TOTAL POPULATION AND AVERAGE ANNUAL GROWTH RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1985–2010—Continued

[Absolute numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series]

| Country and series | 1985 ¹ | 1990 | 1995 | 2000 | 2005 | 2010 | Average annual growth rate | | | | | |
|--------------------|-------------------|--------|--------|--------|--------|--------|----------------------------|---------|-----------|-----------|-----------|-----------|
| | | | | | | | 1985–90 | 1990–95 | 1995–2000 | 2000–2005 | 2005–2010 | 1985–2010 |
| Poland: | | | | | | | | | | | | |
| High..... | 37,202 | 38,534 | 39,623 | 40,729 | 41,911 | 43,142 | .7 | .6 | .6 | .6 | .6 | .6 |
| Medium..... | | 38,363 | 39,187 | 39,926 | 40,663 | 41,392 | .6 | .4 | .4 | .4 | .4 | .4 |
| Low..... | | 38,192 | 38,750 | 39,123 | 39,416 | 39,658 | .5 | .3 | .2 | .1 | .1 | .3 |
| Constant..... | | 38,429 | 39,515 | 40,739 | 42,107 | 43,509 | .6 | .6 | .6 | .7 | .7 | .6 |
| Romania: | | | | | | | | | | | | |
| High..... | 22,727 | 23,369 | 24,128 | 24,893 | 25,530 | 26,067 | .6 | .6 | .6 | .5 | .4 | .5 |
| Medium..... | | 23,269 | 23,855 | 24,381 | 24,748 | 24,992 | .5 | .5 | .4 | .3 | .2 | .4 |
| Low..... | | 23,170 | 23,582 | 23,869 | 23,968 | 23,930 | .4 | .4 | .2 | .1 | .0 | .2 |
| Constant..... | | 23,307 | 24,055 | 24,877 | 25,600 | 26,204 | .5 | .6 | .7 | .6 | .5 | .6 |
| Yugoslavia: | | | | | | | | | | | | |
| High..... | 23,122 | 23,965 | 24,767 | 25,539 | 26,208 | 26,761 | .7 | .7 | .6 | .5 | .4 | .6 |
| Medium..... | | 23,864 | 24,498 | 25,040 | 25,443 | 25,707 | .6 | .5 | .4 | .3 | .2 | .4 |
| Low..... | | 23,764 | 24,229 | 24,540 | 24,679 | 24,663 | .5 | .4 | .3 | .1 | .0 | .3 |
| Constant..... | | 23,880 | 24,576 | 25,228 | 25,766 | 26,168 | .6 | .6 | .5 | .4 | .3 | .5 |

¹ The 1985 population figures shown here are those from the projections and are consistent with the age-sex distributions shown in appendix table II. In some cases they are slightly different from the reported or estimated 1985 population figures shown in table I and in appendix table I.

TABLE 4.—PROJECTED VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1986–2010

[Rates per thousand population; see text for an explanation of the series]

| Rate, series, and year | Eastern Europe | Albania | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia |
|--------------------------|----------------|---------|----------|----------------|----------------------------|---------|--------|---------|------------|
| Birth: | | | | | | | | | |
| High: | | | | | | | | | |
| 1986..... | 16.5 | 27.6 | 13.7 | 15.1 | 14.3 | 12.7 | 18.7 | 16.5 | 16.6 |
| 1990..... | 16.0 | 25.3 | 14.1 | 15.0 | 14.1 | 13.2 | 16.7 | 17.4 | 16.1 |
| 2000..... | 15.6 | 18.8 | 15.0 | 16.4 | 13.7 | 15.5 | 15.6 | 16.2 | 15.4 |
| 2010..... | 15.1 | 18.0 | 14.0 | 14.6 | 14.2 | 13.7 | 16.0 | 15.2 | 14.7 |
| Medium: | | | | | | | | | |
| 1986..... | 15.7 | 26.3 | 13.1 | 14.4 | 13.6 | 12.1 | 17.8 | 15.8 | 15.8 |
| 1990..... | 14.9 | 23.8 | 13.1 | 13.9 | 13.1 | 12.3 | 15.6 | 16.3 | 15.0 |
| 2000..... | 13.8 | 17.6 | 13.2 | 14.5 | 12.0 | 13.6 | 13.8 | 14.3 | 13.6 |
| 2010..... | 13.1 | 16.6 | 12.1 | 12.7 | 12.2 | 11.9 | 14.0 | 13.2 | 12.8 |
| Low: | | | | | | | | | |
| 1986..... | 14.9 | 25.0 | 12.4 | 13.7 | 12.9 | 11.5 | 16.9 | 15.0 | 15.0 |
| 1990..... | 13.8 | 22.3 | 12.1 | 12.9 | 12.0 | 11.3 | 14.4 | 15.1 | 13.9 |
| 2000..... | 11.9 | 16.3 | 11.3 | 12.4 | 10.3 | 11.7 | 11.8 | 12.3 | 11.7 |
| 2010..... | 11.2 | 15.2 | 10.1 | 10.7 | 10.2 | 10.0 | 12.0 | 11.2 | 10.9 |
| Constant: | | | | | | | | | |
| 1986..... | 15.7 | 26.3 | 13.1 | 14.4 | 13.6 | 12.1 | 17.8 | 15.8 | 15.8 |
| 1990..... | 15.4 | 26.9 | 13.2 | 14.2 | 12.7 | 12.2 | 16.4 | 17.1 | 15.3 |
| 2000..... | 15.3 | 24.8 | 13.4 | 15.5 | 11.1 | 13.2 | 16.5 | 17.0 | 14.6 |
| 2010..... | 14.6 | 22.9 | 12.3 | 13.6 | 11.2 | 11.5 | 16.6 | 15.5 | 13.7 |
| Death: | | | | | | | | | |
| High: | | | | | | | | | |
| 1986..... | 11.0 | 5.8 | 12.2 | 11.7 | 13.4 | 13.9 | 10.3 | 10.4 | 9.2 |
| 1990..... | 11.0 | 5.8 | 12.5 | 11.5 | 12.8 | 14.2 | 10.5 | 10.8 | 9.3 |
| 2000..... | 10.6 | 5.8 | 12.5 | 10.7 | 11.5 | 13.2 | 10.1 | 10.5 | 9.6 |
| 2010..... | 11.0 | 6.4 | 12.6 | 10.7 | 12.3 | 12.8 | 10.4 | 11.0 | 10.9 |
| Medium: | | | | | | | | | |
| 1986..... | 11.0 | 5.8 | 12.2 | 11.7 | 13.4 | 13.9 | 10.3 | 10.4 | 9.2 |
| 1990..... | 11.0 | 5.8 | 12.5 | 11.6 | 12.8 | 14.3 | 10.5 | 10.8 | 9.3 |
| 2000..... | 10.7 | 5.8 | 12.7 | 10.9 | 11.7 | 13.4 | 10.3 | 10.7 | 9.7 |
| 2010..... | 11.4 | 6.5 | 13.1 | 11.1 | 12.7 | 13.3 | 10.8 | 11.5 | 11.3 |
| Low: | | | | | | | | | |
| 1986..... | 11.0 | 5.8 | 12.2 | 11.7 | 13.4 | 13.9 | 10.3 | 10.4 | 9.2 |
| 1990..... | 11.1 | 5.7 | 12.6 | 11.6 | 12.8 | 14.3 | 10.5 | 10.9 | 9.3 |
| 2000..... | 10.9 | 5.8 | 12.9 | 11.0 | 11.9 | 13.6 | 10.4 | 10.9 | 9.9 |
| 2010..... | 11.9 | 6.6 | 13.6 | 11.6 | 13.2 | 13.8 | 11.2 | 11.9 | 11.7 |
| Constant: | | | | | | | | | |
| 1986..... | 11.0 | 5.8 | 12.2 | 11.7 | 13.4 | 13.9 | 10.3 | 10.4 | 9.2 |
| 1990..... | 11.1 | 5.9 | 12.5 | 11.6 | 12.8 | 14.3 | 10.5 | 10.9 | 9.3 |
| 2000..... | 10.6 | 6.0 | 12.6 | 10.8 | 11.7 | 13.4 | 10.1 | 10.6 | 9.7 |
| 2010..... | 11.2 | 6.3 | 13.1 | 10.9 | 12.9 | 13.4 | 10.3 | 11.0 | 11.1 |
| Natural increase: | | | | | | | | | |
| High: | | | | | | | | | |
| 1986..... | 5.5 | 21.8 | 1.6 | 3.4 | .9 | -1.3 | 8.4 | 6.1 | 7.4 |
| 1990..... | 5.0 | 19.5 | 1.5 | 3.4 | 1.3 | -1.0 | 6.2 | 6.6 | 6.9 |
| 2000..... | 5.0 | 13.0 | 2.6 | 5.8 | 2.2 | 2.3 | 5.5 | 5.7 | 5.8 |
| 2010..... | 4.1 | 11.6 | 1.4 | 3.9 | 1.9 | .9 | 5.6 | 4.1 | 3.8 |
| Medium: | | | | | | | | | |
| 1986..... | 4.7 | 20.6 | .9 | 2.7 | .2 | -1.9 | 7.5 | 5.4 | 6.7 |
| 1990..... | 3.8 | 18.0 | .6 | 2.3 | .3 | -2.0 | 5.1 | 5.4 | 5.7 |
| 2000..... | 3.0 | 11.8 | .6 | 3.6 | .4 | .3 | 3.5 | 3.6 | 3.8 |
| 2010..... | 1.7 | 10.1 | -1.0 | 1.6 | -.5 | -1.4 | 3.3 | 1.7 | 1.6 |
| Low: | | | | | | | | | |
| 1986..... | 3.9 | 19.3 | .3 | 2.0 | -.5 | -2.5 | 6.6 | 4.6 | 5.9 |
| 1990..... | 2.7 | 16.6 | -.5 | 1.3 | -.8 | -3.0 | 3.9 | 4.2 | 4.6 |
| 2000..... | 1.0 | 10.5 | -1.5 | 1.4 | -1.6 | -1.9 | 1.4 | 1.4 | 1.8 |
| 2010..... | -.7 | 8.5 | -3.5 | -.8 | -3.0 | -3.8 | .8 | -.7 | -.8 |

TABLE 4.—PROJECTED VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1986–2010—
Continued

[Rates per thousand population; see text for an explanation of the series]

| Rate, series, and year | Eastern Europe | Albania | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia |
|------------------------|----------------|---------|----------|----------------|----------------------------|---------|--------|---------|------------|
| Constant: | | | | | | | | | |
| 1986..... | 4.7 | 20.6 | .9 | 2.7 | .2 | -1.9 | 7.5 | 5.4 | 6.7 |
| 1990..... | 4.3 | 20.9 | .6 | 2.6 | -.1 | -2.1 | 5.9 | 6.2 | 6.0 |
| 2000..... | 4.7 | 18.7 | .8 | 4.7 | -.7 | -.2 | 6.4 | 6.4 | 4.9 |
| 2010..... | 3.5 | 16.7 | -.8 | 2.6 | -1.7 | -1.8 | 6.3 | 4.5 | 2.6 |

TABLE 5.—SELECTED AGE-SEX CHARACTERISTICS OF THE POPULATION—EIGHT EASTERN EUROPEAN COUNTRIES: 1950, 1985, AND 2010

[As of midyear; percentages may not add totals due to rounding; see text for an explanation of the series]

| Country, year, and series | Percent distribution by age group | | | | | Median age (in years) | Males per 100 females | Dependency ratio ^a |
|-----------------------------|-----------------------------------|---------|----------|----------|-------------|-----------------------|-----------------------|-------------------------------|
| | All ages | 0 to 14 | 15 to 39 | 40 to 64 | 65 and over | | | |
| Eastern Europe: | | | | | | | | |
| 1950..... | 100.0 | 27.5 | 38.1 | 27.6 | 6.8 | 27.9 | 91.0 | 522.3 |
| 1985..... | 100.0 | 23.8 | 37.7 | 28.2 | 10.2 | 32.1 | 95.5 | 516.3 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 22.0 | 34.9 | 30.7 | 12.5 | 34.9 | 96.8 | 525.2 |
| Medium..... | 100.0 | 19.8 | 35.3 | 32.0 | 13.0 | 36.4 | 96.5 | 487.2 |
| Low..... | 100.0 | 17.4 | 35.7 | 33.3 | 13.6 | 37.9 | 96.1 | 448.6 |
| Constant..... | 100.0 | 21.6 | 34.7 | 31.1 | 12.6 | 35.3 | 96.7 | 519.8 |
| Albania: | | | | | | | | |
| 1950..... | 100.0 | 39.0 | 36.7 | 17.4 | 6.9 | 20.6 | 105.5 | 848.2 |
| 1985..... | 100.0 | 33.8 | 42.1 | 18.3 | 5.8 | 22.8 | 106.0 | 656.1 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 24.3 | 40.0 | 27.1 | 8.6 | 30.2 | 104.7 | 489.8 |
| Medium..... | 100.0 | 22.9 | 40.3 | 28.0 | 8.8 | 31.3 | 104.6 | 465.0 |
| Low..... | 100.0 | 21.4 | 40.5 | 28.9 | 9.1 | 32.4 | 104.5 | 439.6 |
| Constant..... | 100.0 | 29.9 | 37.6 | 24.7 | 7.8 | 27.2 | 105.0 | 604.9 |
| Bulgaria: | | | | | | | | |
| 1950..... | 100.0 | 26.8 | 41.3 | 25.1 | 6.7 | 27.3 | 99.9 | 504.8 |
| 1985..... | 100.0 | 21.6 | 35.5 | 31.6 | 11.4 | 35.2 | 98.1 | 492.2 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 21.2 | 33.4 | 31.1 | 14.3 | 36.6 | 96.3 | 550.9 |
| Medium..... | 100.0 | 19.0 | 33.8 | 32.3 | 14.9 | 38.1 | 95.9 | 512.6 |
| Low..... | 100.0 | 16.6 | 34.1 | 33.7 | 15.5 | 39.5 | 95.6 | 473.9 |
| Constant..... | 100.0 | 19.2 | 33.7 | 32.2 | 14.8 | 37.9 | 96.0 | 516.6 |
| Czechoslovakia: | | | | | | | | |
| 1950..... | 100.0 | 25.4 | 36.8 | 29.9 | 7.8 | 30.6 | 94.4 | 497.9 |
| 1985..... | 100.0 | 24.4 | 37.1 | 27.4 | 11.0 | 32.7 | 94.9 | 548.6 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 22.5 | 35.1 | 30.5 | 11.8 | 34.8 | 96.0 | 523.2 |
| Medium..... | 100.0 | 20.2 | 35.6 | 31.8 | 12.3 | 36.1 | 95.6 | 483.2 |
| Low..... | 100.0 | 17.8 | 36.1 | 33.2 | 12.9 | 37.5 | 95.3 | 442.8 |
| Constant..... | 100.0 | 21.4 | 35.2 | 31.3 | 12.1 | 35.5 | 95.8 | 504.0 |
| German Democratic Republic: | | | | | | | | |
| 1950..... | 100.0 | 22.8 | 31.0 | 35.6 | 10.6 | 37.3 | 79.8 | 502.0 |
| 1985..... | 100.0 | 19.3 | 36.6 | 30.6 | 13.5 | 34.6 | 89.7 | 487.7 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 20.1 | 31.4 | 33.0 | 15.5 | 38.6 | 96.4 | 553.2 |
| Medium..... | 100.0 | 18.0 | 31.6 | 34.3 | 16.1 | 40.3 | 96.0 | 517.4 |
| Low..... | 100.0 | 15.7 | 31.9 | 35.6 | 16.8 | 41.6 | 95.6 | 481.3 |
| Constant..... | 100.0 | 16.8 | 31.9 | 34.9 | 16.4 | 40.9 | 95.8 | 496.9 |

TABLE 5.—SELECTED AGE-SEX CHARACTERISTICS OF THE POPULATION—EIGHT EASTERN EUROPEAN COUNTRIES: 1950, 1985, AND 2010—Continued

(As of midyear; percentages may not add totals due to rounding; see text for an explanation of the series)

| Country, year, and series | Percent distribution by age group | | | | | Median age (in years) | Males per 100 females | Dependency ratio ¹ |
|---------------------------|-----------------------------------|---------|----------|----------|-------------|-----------------------|-----------------------|-------------------------------|
| | All ages | 0 to 14 | 15 to 39 | 40 to 64 | 65 and over | | | |
| Hungary: | | | | | | | | |
| 1950..... | 100.0 | 25.1 | 38.3 | 29.3 | 7.3 | 29.9 | 92.8 | 480.1 |
| 1985..... | 100.0 | 21.5 | 35.6 | 30.5 | 12.4 | 35.0 | 93.4 | 511.9 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 21.5 | 33.5 | 31.2 | 13.8 | 36.5 | 93.5 | 546.5 |
| Medium..... | 100.0 | 19.3 | 33.9 | 32.5 | 14.4 | 37.9 | 93.1 | 508.0 |
| Low..... | 100.0 | 16.9 | 34.3 | 33.8 | 15.0 | 39.2 | 92.6 | 469.0 |
| Constant..... | 100.0 | 18.8 | 34.0 | 32.7 | 14.5 | 38.1 | 93.0 | 499.8 |
| Poland: | | | | | | | | |
| 1950..... | 100.0 | 29.4 | 40.3 | 25.1 | 5.2 | 25.8 | 90.9 | 529.5 |
| 1985..... | 100.0 | 25.5 | 39.3 | 25.8 | 9.4 | 30.8 | 95.2 | 537.1 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 22.5 | 36.1 | 30.5 | 10.9 | 33.5 | 96.0 | 500.6 |
| Medium..... | 100.0 | 20.2 | 36.6 | 31.8 | 11.4 | 34.9 | 95.6 | 461.8 |
| Low..... | 100.0 | 17.8 | 37.1 | 33.2 | 11.9 | 36.5 | 95.2 | 422.3 |
| Constant..... | 100.0 | 23.4 | 35.6 | 30.3 | 10.8 | 33.2 | 96.1 | 519.0 |
| Romania: | | | | | | | | |
| 1950..... | 100.0 | 28.4 | 40.9 | 25.4 | 5.3 | 26.1 | 93.9 | 509.2 |
| 1985..... | 100.0 | 24.6 | 36.8 | 29.1 | 9.5 | 31.8 | 97.4 | 517.9 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 22.5 | 35.7 | 29.3 | 12.5 | 34.3 | 97.8 | 537.7 |
| Medium..... | 100.0 | 20.2 | 36.2 | 30.6 | 13.0 | 35.7 | 97.5 | 498.3 |
| Low..... | 100.0 | 17.8 | 36.6 | 31.9 | 13.6 | 37.1 | 97.2 | 458.3 |
| Constant..... | 100.0 | 23.2 | 35.2 | 29.2 | 12.4 | 34.1 | 97.9 | 552.5 |
| Yugoslavia: | | | | | | | | |
| 1950..... | 100.0 | 31.1 | 39.6 | 23.6 | 5.7 | 24.1 | 93.2 | 582.0 |
| 1985..... | 100.0 | 23.9 | 38.8 | 28.9 | 8.4 | 31.3 | 97.8 | 477.8 |
| 2010: | | | | | | | | |
| High..... | 100.0 | 21.5 | 34.3 | 31.2 | 13.0 | 35.7 | 98.4 | 525.7 |
| Medium..... | 100.0 | 19.3 | 34.7 | 32.5 | 13.5 | 37.1 | 98.1 | 488.3 |
| Low..... | 100.0 | 17.0 | 35.1 | 33.9 | 14.1 | 38.6 | 97.8 | 450.3 |
| Constant..... | 100.0 | 20.4 | 34.4 | 31.9 | 13.3 | 36.5 | 98.2 | 508.2 |

¹ Number of persons under 15 and 65 and over per thousand persons of age 15 to 65.

TABLE 6.—ESTIMATED AND ASSUMED TOTAL FERTILITY RATES—EIGHT EASTERN EUROPEAN COUNTRIES: 1985, 1986, AND 2000

| Year and series | Albania | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia |
|-----------------|---------|----------|----------------|----------------------------|---------|--------|---------|------------|
| 1985..... | 3.28 | 1.93 | 2.05 | 1.75 | 1.84 | 2.33 | 2.30 | 2.05 |
| 1986: | | | | | | | | |
| High..... | 3.44 | 2.03 | 2.16 | 1.84 | 1.93 | 2.45 | 2.42 | 2.16 |
| Medium..... | 3.28 | 1.93 | 2.05 | 1.75 | 1.84 | 2.33 | 2.30 | 2.05 |
| Low..... | 3.12 | 1.83 | 1.95 | 1.66 | 1.75 | 2.21 | 2.19 | 1.95 |
| Constant..... | 3.28 | 1.93 | 2.05 | 1.75 | 1.84 | 2.33 | 2.30 | 2.05 |
| 2000: | | | | | | | | |
| High..... | 2.40 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 |
| Medium..... | 2.20 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 |
| Low..... | 2.00 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 |
| Constant..... | 3.28 | 1.93 | 2.05 | 1.75 | 1.84 | 2.33 | 2.30 | 2.05 |

TABLE 7.—LIFE EXPECTANCIES AT BIRTH, BY SEX—EIGHT EASTERN EUROPEAN COUNTRIES:
1985 AND 2010

| Country | 1985 (estimated) | | | 2010 (projected) | | |
|---------------------------------|------------------|------|--------|------------------|------|--------|
| | Both sexes | Male | Female | Both sexes | Male | Female |
| Albania..... | 73.2 | 70.0 | 76.8 | 74.9 | 71.8 | 78.3 |
| Bulgaria..... | 70.8 | 67.6 | 74.2 | 73.5 | 70.3 | 76.8 |
| Czechoslovakia..... | 71.1 | 67.4 | 75.0 | 74.0 | 70.6 | 77.5 |
| German Democratic Republic..... | 72.4 | 69.2 | 75.2 | 74.5 | 71.4 | 77.5 |
| Hungary..... | 69.1 | 65.0 | 73.4 | 72.7 | 69.0 | 76.4 |
| Poland..... | 70.2 | 66.1 | 74.5 | 73.2 | 69.5 | 76.9 |
| Romania..... | 70.2 | 67.3 | 73.1 | 73.1 | 70.1 | 76.2 |
| Yugoslavia..... | 71.2 | 68.1 | 74.4 | 74.0 | 70.9 | 77.2 |

TABLE I-A.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES COMBINED: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus mid-year-to-mid-year), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding, see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|----------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| Estimates | | | | | | | |
| 1950..... | 160,061 | 1,438 | 13.6 | 2,702 | 25.5 | 1,264 | 11.9 |
| 1955..... | 111,692 | 1,533 | 13.7 | 2,689 | 24.1 | 1,156 | 10.3 |
| 1960..... | 116,565 | 1,212 | 10.4 | 2,321 | 19.9 | 1,109 | 9.5 |
| 1965..... | 121,110 | 941 | 7.8 | 2,070 | 17.1 | 1,129 | 9.3 |
| 1970..... | 125,500 | 896 | 7.1 | 2,162 | 17.2 | 1,265 | 10.1 |
| 1975..... | 129,837 | 1,003 | 7.7 | 2,331 | 18.0 | 1,328 | 10.2 |
| 1980..... | 134,301 | 851 | 6.3 | 2,315 | 17.2 | 1,464 | 10.9 |
| 1981..... | 135,088 | 818 | 6.1 | 2,244 | 16.6 | 1,425 | 10.6 |
| 1982..... | 135,794 | 802 | 5.9 | 2,235 | 16.5 | 1,433 | 10.5 |
| 1983..... | 136,479 | 724 | 5.3 | 2,204 | 16.1 | 1,480 | 10.8 |
| 1984..... | 137,127 | 727 | 5.3 | 2,210 | 16.1 | 1,483 | 10.8 |
| 1985..... | 137,752 | 663 | 4.8 | 2,184 | 15.9 | 1,521 | 11.0 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 138,416 | 761 | 5.5 | 2,279 | 16.5 | 1,518 | 11.0 |
| 1987..... | 139,109 | 733 | 5.3 | 2,261 | 16.3 | 1,528 | 11.0 |
| 1988..... | 139,792 | 727 | 5.2 | 2,263 | 16.2 | 1,536 | 11.0 |
| 1989..... | 140,473 | 715 | 5.1 | 2,260 | 16.1 | 1,545 | 11.0 |
| 1990..... | 141,147 | 701 | 5.0 | 2,258 | 16.0 | 1,557 | 11.0 |
| 1995..... | 144,578 | 709 | 4.9 | 2,262 | 15.6 | 1,553 | 10.7 |
| 2000..... | 148,296 | 746 | 5.0 | 2,312 | 15.6 | 1,566 | 10.6 |
| 2005..... | 151,846 | 669 | 4.4 | 3,321 | 15.3 | 1,653 | 10.9 |
| 2010..... | 155,078 | 628 | 4.1 | 2,337 | 15.1 | 1,709 | 11.0 |
| Medium series: | | | | | | | |
| 1986..... | 138,362 | 654 | 4.7 | 2,171 | 15.7 | 1,517 | 11.0 |
| 1987..... | 138,942 | 614 | 4.4 | 2,140 | 15.4 | 1,526 | 11.0 |
| 1988..... | 139,500 | 594 | 4.3 | 2,127 | 15.2 | 1,533 | 11.0 |
| 1989..... | 140,041 | 569 | 4.1 | 2,110 | 15.1 | 1,541 | 11.0 |
| 1990..... | 140,561 | 541 | 3.8 | 2,094 | 14.9 | 1,553 | 11.0 |
| 1995..... | 143,023 | 480 | 3.4 | 2,028 | 14.2 | 1,548 | 10.8 |
| 2000..... | 145,404 | 441 | 3.0 | 2,001 | 13.8 | 1,560 | 10.7 |
| 2005..... | 147,398 | 350 | 2.4 | 1,996 | 13.5 | 1,646 | 11.2 |
| 2010..... | 148,915 | 255 | 1.7 | 1,956 | 13.1 | 1,702 | 11.4 |
| Low series: | | | | | | | |
| 1986..... | 138,308 | 546 | 3.9 | 2,062 | 14.9 | 1,516 | 11.0 |
| 1987..... | 138,776 | 495 | 3.6 | 2,018 | 14.5 | 1,523 | 11.0 |

TABLE I-A.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—EIGHT EASTERN EUROPEAN COUNTRIES COMBINED: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|------------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| 1988..... | 139,207 | 461 | 3.3 | 1,991 | 14.3 | 1,530 | 11.0 |
| 1989..... | 139,608 | 422 | 3.0 | 1,960 | 14.0 | 1,538 | 11.0 |
| 1990..... | 139,975 | 381 | 2.7 | 1,930 | 13.8 | 1,549 | 11.1 |
| 1995..... | 141,467 | 250 | 1.8 | 1,793 | 12.7 | 1,543 | 10.9 |
| 2000..... | 142,511 | 136 | 1.0 | 1,689 | 11.9 | 1,553 | 10.9 |
| 2005..... | 142,956 | 35 | .2 | 1,675 | 11.7 | 1,640 | 11.5 |
| 2010..... | 142,813 | -99 | -.7 | 1,596 | 11.2 | 1,695 | 11.9 |
| Constant series: | | | | | | | |
| 1986..... | 138,362 | 654 | 4.7 | 2,171 | 15.7 | 1,517 | 11.0 |
| 1987..... | 138,951 | 631 | 4.5 | 2,157 | 15.5 | 1,526 | 11.0 |
| 1988..... | 139,533 | 628 | 4.5 | 2,162 | 15.5 | 1,534 | 11.0 |
| 1989..... | 140,116 | 619 | 4.4 | 2,162 | 15.4 | 1,543 | 11.0 |
| 1990..... | 140,696 | 609 | 4.3 | 2,163 | 15.4 | 1,555 | 11.1 |
| 1995..... | 143,713 | 636 | 4.4 | 2,188 | 15.2 | 1,552 | 10.8 |
| 2000..... | 147,111 | 691 | 4.7 | 2,258 | 15.3 | 1,566 | 10.6 |
| 2005..... | 150,375 | 608 | 4.0 | 2,261 | 15.0 | 1,653 | 11.0 |
| 2010..... | 153,219 | 532 | 3.5 | 2,241 | 14.6 | 1,709 | 11.2 |

TABLE I-B.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—ALBANIA: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increases and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|--------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| Estimates | | | | | | | |
| 1950..... | 1,215 | 30 | 24.7 | 47 | 38.9 | 17 | 14.2 |
| 1955..... | 1,379 | 41 | 29.4 | 61 | 44.5 | 21 | 15.1 |
| 1960..... | 1,607 | 53 | 32.9 | 70 | 43.4 | 17 | 10.4 |
| 1965..... | 1,865 | 49 | 26.2 | 66 | 35.2 | 17 | 9.0 |
| 1970..... | 2,136 | 50 | 23.3 | 70 | 32.5 | 20 | 9.3 |
| 1975..... | 2,401 | 54 | 22.3 | 71 | 29.6 | 17 | 7.2 |
| 1980..... | 2,671 | 54 | 20.1 | 71 | 26.5 | 17 | 6.4 |
| 1981..... | 2,725 | 54 | 19.9 | 72 | 26.5 | 18 | 6.6 |
| 1982..... | 2,783 | 61 | 21.8 | 77 | 27.8 | 17 | 5.9 |
| 1983..... | 2,841 | 56 | 19.8 | 74 | 26.0 | 17 | 6.1 |
| 1984..... | 2,901 | 63 | 21.6 | 79 | 27.3 | 17 | 5.7 |
| 1985..... | 2,962 | 60 | 20.4 | 78 | 26.2 | 17 | 5.8 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 3,026 | 66 | 21.8 | 84 | 27.6 | 18 | 5.8 |
| 1987..... | 3,092 | 66 | 21.3 | 84 | 27.1 | 18 | 5.9 |
| 1988..... | 3,157 | 65 | 20.7 | 84 | 26.6 | 19 | 5.9 |
| 1989..... | 3,223 | 65 | 20.2 | 84 | 26.0 | 19 | 5.9 |
| 1990..... | 3,287 | 64 | 19.5 | 83 | 25.3 | 19 | 5.8 |
| 1995..... | 3,595 | 58 | 16.2 | 79 | 22.0 | 21 | 5.8 |
| 2000..... | 3,867 | 50 | 13.0 | 73 | 18.8 | 23 | 5.8 |
| 2005..... | 4,117 | 50 | 12.2 | 75 | 18.2 | 25 | 6.1 |

TABLE I-B.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—ALBANIA: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increases and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|------------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| 2010..... | 4,369 | 51 | 11.6 | 79 | 18.0 | 28 | 6.4 |
| Medium series: | | | | | | | |
| 1986..... | 3,024 | 62 | 20.6 | 80 | 26.3 | 18 | 5.8 |
| 1987..... | 3,086 | 62 | 20.0 | 80 | 25.8 | 18 | 5.8 |
| 1988..... | 3,147 | 61 | 19.4 | 79 | 25.2 | 18 | 5.8 |
| 1989..... | 3,208 | 60 | 18.8 | 79 | 24.6 | 19 | 5.8 |
| 1990..... | 3,268 | 59 | 18.0 | 78 | 23.8 | 19 | 5.8 |
| 1995..... | 3,548 | 52 | 14.8 | 73 | 20.5 | 20 | 5.8 |
| 2000..... | 3,792 | 45 | 11.8 | 67 | 17.6 | 22 | 5.8 |
| 2005..... | 4,013 | 44 | 10.9 | 68 | 17.0 | 25 | 6.1 |
| 2010..... | 4,229 | 43 | 10.1 | 70 | 16.6 | 28 | 6.5 |
| Low series: | | | | | | | |
| 1986..... | 3,022 | 58 | 19.3 | 76 | 25.0 | 17 | 5.8 |
| 1987..... | 3,080 | 58 | 18.7 | 75 | 24.4 | 18 | 5.7 |
| 1988..... | 3,137 | 57 | 18.1 | 75 | 23.8 | 18 | 5.7 |
| 1989..... | 3,193 | 56 | 17.4 | 74 | 23.1 | 18 | 5.7 |
| 1990..... | 3,248 | 54 | 16.6 | 72 | 22.3 | 19 | 5.7 |
| 1995..... | 3,501 | 46 | 13.3 | 66 | 19.0 | 20 | 5.7 |
| 2000..... | 3,715 | 39 | 10.5 | 61 | 16.3 | 22 | 5.8 |
| 2005..... | 3,907 | 38 | 9.6 | 62 | 15.8 | 24 | 6.2 |
| 2010..... | 4,088 | 35 | 8.5 | 62 | 15.2 | 27 | 6.6 |
| Constant series: | | | | | | | |
| 1986..... | 3,024 | 62 | 20.6 | 80 | 26.3 | 18 | 5.8 |
| 1987..... | 3,087 | 64 | 20.7 | 82 | 26.6 | 18 | 5.8 |
| 1988..... | 3,152 | 66 | 20.9 | 84 | 26.8 | 18 | 5.9 |
| 1989..... | 3,219 | 68 | 21.0 | 87 | 26.9 | 19 | 5.9 |
| 1990..... | 3,287 | 69 | 20.9 | 88 | 26.9 | 19 | 5.9 |
| 1995..... | 3,645 | 74 | 20.2 | 95 | 26.2 | 22 | 6.0 |
| 2000..... | 4,019 | 75 | 18.7 | 99 | 24.8 | 24 | 6.0 |
| 2005..... | 4,398 | 77 | 17.4 | 103 | 23.5 | 27 | 6.1 |
| 2010..... | 4,787 | 80 | 16.7 | 110 | 22.9 | 30 | 6.3 |

TABLE I-C.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—BULGARIA: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding, see text for an explanation of the series.]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|-----------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| Estimates | | | | | | | |
| 1950..... | 7,251 | 108 | 15.0 | 183 | 25.2 | 74 | 10.2 |
| 1955..... | 7,499 | 83 | 11.1 | 151 | 20.1 | 68 | 9.1 |
| 1960..... | 7,867 | 76 | 9.7 | 140 | 17.8 | 64 | 8.1 |
| 1965..... | 8,201 | 59 | 7.2 | 126 | 15.3 | 67 | 8.2 |
| 1970..... | 8,490 | 62 | 7.3 | 139 | 16.3 | 77 | 9.1 |
| 1975..... | 8,721 | 55 | 6.3 | 145 | 16.6 | 90 | 10.3 |
| 1980..... | 8,844 | 30 | 3.4 | 128 | 14.5 | 98 | 11.1 |
| 1981..... | 8,869 | 29 | 3.3 | 124 | 14.0 | 94 | 10.8 |
| 1982..... | 8,892 | 24 | 2.7 | 124 | 14.0 | 100 | 11.3 |
| 1983..... | 8,910 | 21 | 2.3 | 123 | 13.8 | 102 | 11.5 |

TABLE I-C.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—BULGARIA: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|------------------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| 1984 | 8,928 | 21 | 2.3 | 122 | 13.7 | 101 | 11.4 |
| 1985 | 8,944 | 11 | 1.3 | 119 | 13.3 | 107 | 12.0 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986 | 8,956 | 14 | 1.6 | 123 | 13.7 | 109 | 12.2 |
| 1987 | 8,970 | 13 | 1.5 | 123 | 13.7 | 110 | 12.3 |
| 1988 | 8,983 | 13 | 1.5 | 124 | 13.8 | 110 | 12.3 |
| 1989 | 8,997 | 14 | 1.6 | 125 | 13.9 | 111 | 12.4 |
| 1990 | 9,011 | 14 | 1.6 | 127 | 14.1 | 113 | 12.5 |
| 1995 | 9,100 | 21 | 2.3 | 134 | 14.8 | 114 | 12.5 |
| 2000 | 9,218 | 24 | 2.6 | 138 | 15.0 | 115 | 12.5 |
| 2005 | 9,311 | 14 | 1.5 | 133 | 14.3 | 119 | 12.7 |
| 2010 | 9,377 | 13 | 1.4 | 132 | 14.0 | 118 | 12.6 |
| Medium series: | | | | | | | |
| 1986 | 8,953 | 8 | .9 | 117 | 13.1 | 109 | 12.2 |
| 1987 | 8,961 | 7 | .7 | 116 | 13.0 | 110 | 12.3 |
| 1988 | 8,967 | 6 | .7 | 116 | 12.9 | 110 | 12.3 |
| 1989 | 8,973 | 6 | .6 | 117 | 13.0 | 111 | 12.4 |
| 1990 | 8,978 | 5 | .6 | 118 | 13.1 | 113 | 12.5 |
| 1995 | 9,009 | 7 | .8 | 120 | 13.3 | 113 | 12.6 |
| 2000 | 9,046 | 5 | .6 | 119 | 13.2 | 114 | 12.7 |
| 2005 | 9,045 | -5 | -.5 | 114 | 12.6 | 118 | 13.1 |
| 2010 | 9,008 | -9 | -1.0 | 109 | 12.1 | 118 | 13.1 |
| Low series: | | | | | | | |
| 1986 | 8,950 | 3 | .3 | 111 | 12.4 | 109 | 12.2 |
| 1987 | 8,952 | 0 | .0 | 110 | 12.2 | 110 | 12.3 |
| 1988 | 8,951 | -2 | -.2 | 108 | 12.1 | 110 | 12.3 |
| 1989 | 8,949 | -3 | -.3 | 108 | 12.1 | 111 | 12.4 |
| 1990 | 8,945 | -4 | -.5 | 108 | 12.1 | 112 | 12.6 |
| 1995 | 8,918 | -7 | -.8 | 106 | 11.9 | 113 | 12.7 |
| 2000 | 8,873 | -14 | -1.5 | 101 | 11.3 | 114 | 12.9 |
| 2005 | 8,780 | -23 | -2.6 | 95 | 10.8 | 118 | 13.4 |
| 2010 | 8,645 | -30 | -3.5 | 87 | 10.1 | 118 | 13.6 |
| Constant series: | | | | | | | |
| 1986 | 8,953 | 8 | .9 | 117 | 13.1 | 109 | 12.2 |
| 1987 | 8,961 | 7 | .7 | 116 | 13.0 | 110 | 12.3 |
| 1988 | 8,967 | 6 | .7 | 116 | 13.0 | 110 | 12.3 |
| 1989 | 8,973 | 6 | .7 | 117 | 13.1 | 111 | 12.4 |
| 1990 | 8,979 | 5 | .6 | 118 | 13.2 | 113 | 12.5 |
| 1995 | 9,015 | 8 | .9 | 121 | 13.5 | 113 | 12.6 |
| 2000 | 9,059 | 7 | .8 | 121 | 13.4 | 115 | 12.6 |
| 2005 | 9,068 | -3 | -.3 | 115 | 12.7 | 118 | 13.0 |
| 2010 | 9,040 | -7 | -.8 | 111 | 12.3 | 118 | 13.1 |

¹ The official population totals for the years 1976–85 have been revised downward here to account for the difference of approximately 33,000 between the 1985 census and the unrevised population estimate for that year. The revised estimates are based on the Dec. 2, 1975 census total of 8,727,771 and adjustments to the official annual population figures so as to be consistent with the Dec. 4, 1985 census total of 8,948,649.

² Rates for the years 1976–85 are based on the published numbers of births and the revised midyear population totals. See footnote 1 above.

TABLE I-D.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—CZECHOSLOVAKIA: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|-------------------------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| Estimates | | | | | | | |
| 1950..... | 12,389 | 145 | 11.7 | 288 | 23.3 | 143 | 11.5 |
| 1955..... | 13,093 | 139 | 10.6 | 265 | 20.3 | 16 | 9.6 |
| 1960..... | 13,654 | 92 | 6.7 | 217 | 15.9 | 125 | 9.2 |
| 1965..... | 14,147 | 91 | 6.4 | 232 | 16.4 | 141 | 10.0 |
| 1970..... | 14,319 | 63 | 4.4 | 229 | 16.0 | 166 | 11.6 |
| 1975..... | 14,772 | 120 | 8.1 | 289 | 19.6 | 170 | 11.5 |
| 1980..... | 15,255 | 63 | 4.1 | 249 | 16.3 | 186 | 12.2 |
| 1981..... | 15,320 | 58 | 3.8 | 238 | 15.5 | 180 | 11.8 |
| 1982..... | 15,369 | 53 | 3.5 | 234 | 15.2 | 181 | 11.8 |
| 1983..... | 15,414 | 43 | 2.8 | 229 | 14.9 | 187 | 12.1 |
| 1984..... | 15,458 | 44 | 2.8 | 228 | 14.7 | 184 | 11.9 |
| 1985..... | 15,500 | 42 | 2.7 | 226 | 14.6 | 184 | 11.9 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 15,547 | 53 | 3.4 | 235 | 15.1 | 183 | 11.7 |
| 1987..... | 15,599 | 52 | 3.3 | 234 | 15.0 | 182 | 11.7 |
| 1988..... | 15,651 | 52 | 3.3 | 234 | 14.9 | 182 | 11.6 |
| 1989..... | 15,703 | 52 | 3.3 | 234 | 14.9 | 182 | 11.6 |
| 1990..... | 15,757 | 54 | 3.4 | 236 | 15.0 | 182 | 11.5 |
| 1995..... | 16,080 | 79 | 4.9 | 257 | 16.0 | 178 | 11.1 |
| 2000..... | 16,533 | 95 | 5.8 | 272 | 16.4 | 176 | 10.7 |
| 2005..... | 19,966 | 77 | 4.5 | 260 | 15.3 | 183 | 10.8 |
| 2010..... | 17,324 | 68 | 3.9 | 253 | 14.6 | 185 | 10.7 |
| Medium series: | | | | | | | |
| 1986..... | 15,541 | 42 | 2.7 | 224 | 14.4 | 182 | 11.7 |
| 1987..... | 15,582 | 40 | 2.5 | 222 | 14.2 | 182 | 11.7 |
| 1988..... | 15,621 | 38 | 2.4 | 220 | 14.1 | 182 | 11.6 |
| 1989..... | 15,658 | 37 | 2.4 | 219 | 14.0 | 182 | 11.6 |
| 1990..... | 15,695 | 37 | 2.3 | 218 | 13.9 | 182 | 11.6 |
| 1995..... | 15,910 | 52 | 3.3 | 230 | 14.5 | 178 | 11.2 |
| 2000..... | 16,204 | 59 | 3.6 | 235 | 15.5 | 176 | 10.9 |
| 2005..... | 16,454 | 40 | 2.5 | 223 | 13.5 | 182 | 11.1 |
| 2010..... | 16,619 | 26 | 1.6 | 211 | 12.7 | 185 | 11.1 |
| Low series: | | | | | | | |
| 1986..... | 15,536 | 31 | 2.0 | 213 | 13.7 | 182 | 11.7 |
| 1987..... | 15,565 | 27 | 1.7 | 209 | 13.4 | 182 | 11.7 |
| 1988..... | 15,590 | 24 | 1.5 | 206 | 13.2 | 182 | 11.6 |
| 1989..... | 15,613 | 21 | 1.4 | 203 | 13.0 | 182 | 11.6 |
| 1990..... | 15,633 | 20 | 1.3 | 201 | 12.9 | 181 | 11.6 |
| 1995..... | 15,741 | 25 | 1.6 | 203 | 12.9 | 178 | 11.3 |
| 2000..... | 15,875 | 22 | 1.4 | 198 | 12.4 | 175 | 11.0 |
| 2005..... | 15,944 | 4 | .3 | 186 | 11.7 | 182 | 11.4 |
| 2010..... | 15,922 | -13 | -.8 | 171 | 10.7 | 184 | 11.6 |
| Constant series: | | | | | | | |
| 1986..... | 15,541 | 42 | 2.7 | 224 | 14.4 | 182 | 11.7 |
| 1987..... | 15,583 | 41 | 2.6 | 223 | 14.3 | 182 | 11.7 |
| 1988..... | 15,623 | 40 | 2.6 | 222 | 14.2 | 182 | 11.6 |
| 1989..... | 15,663 | 40 | 2.6 | 222 | 14.2 | 182 | 11.6 |
| 1990..... | 15,704 | 42 | 2.6 | 223 | 14.2 | 182 | 11.6 |
| 1995..... | 15,959 | 63 | 4.0 | 242 | 15.1 | 178 | 11.2 |
| 2000..... | 16,328 | 77 | 4.7 | 253 | 15.5 | 176 | 10.8 |
| 2005..... | 16,670 | 58 | 3.5 | 241 | 14.4 | 183 | 10.9 |
| 2010..... | 16,924 | 45 | 2.6 | 229 | 13.6 | 185 | 10.9 |

¹ The official population totals for the years 1961–80 have been revised downward here to account for the differences of approximately 148,000 and 51,000 between the 1970 and 1980 census totals and the unrevised population estimates for those years. The revised estimates are based on the Mar. 1, 1961 census total of 13,745,577; reported births and deaths; adjustments to the implied annual net migration figures; and other intercensal adjustments necessary to be consistent with the Dec. 1, 1970 census total of 14,344,987 and Dec. 1, 1980 census total of 15,283,095. These adjustments include the assumption that 60,000 refugees left during the last half of 1968 and 20,000 during the first half of 1969.

² Rates for the years 1961–80 are based on the published numbers of births and deaths and the revised midyear population totals. See footnote 1 above.

TABLE I-É.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—GERMAN DEMOCRATIC REPUBLIC: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|-------------------------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| Estimates | | | | | | | |
| 1950..... | ^a 18,388 | 84 | 4.6 | 304 | 16.5 | 220 | 11.9 |
| 1955..... | 17,832 | 79 | 4.4 | 293 | 16.4 | 214 | 12.0 |
| 1960..... | 17,058 | 59 | 3.5 | 293 | 17.2 | 234 | 13.7 |
| 1965..... | 17,020 | 51 | 3.0 | 281 | 16.5 | 230 | 13.5 |
| 1970..... | 17,070 | -4 | -2 | 237 | 13.9 | 241 | 14.1 |
| 1975..... | 16,850 | -59 | -3.5 | 182 | 10.8 | 240 | 14.3 |
| 1980..... | 16,737 | 7 | .4 | 245 | 14.6 | 238 | 14.2 |
| 1981..... | 16,736 | 5 | .3 | 238 | 14.2 | 232 | 13.9 |
| 1982..... | 16,697 | 12 | .7 | 240 | 14.4 | 228 | 13.7 |
| 1983..... | 16,699 | 11 | .7 | 234 | 14.0 | 223 | 13.3 |
| 1984..... | 16,671 | 7 | .4 | 228 | 13.7 | 221 | 13.3 |
| 1985..... | 16,644 | 2 | .1 | 228 | 13.7 | 225 | 13.5 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 16,633 | 14 | .9 | 237 | 14.3 | 223 | 13.4 |
| 1987..... | 16,628 | 18 | 1.1 | 238 | 14.3 | 220 | 13.3 |
| 1988..... | 16,628 | 21 | 1.2 | 238 | 14.3 | 217 | 13.1 |
| 1989..... | 16,634 | 22 | 1.3 | 237 | 14.2 | 215 | 12.9 |
| 1990..... | 16,642 | 22 | 1.3 | 235 | 14.1 | 212 | 12.8 |
| 1995..... | 16,709 | 17 | 1.0 | 216 | 12.9 | 199 | 11.9 |
| 2000..... | 16,840 | 37 | 2.2 | 230 | 13.7 | 193 | 11.5 |
| 2005..... | 17,027 | 37 | 2.2 | 240 | 14.1 | 202 | 11.9 |
| 2010..... | 17,208 | 33 | 1.9 | 244 | 14.2 | 211 | 12.3 |
| Medium series: | | | | | | | |
| 1986..... | 16,628 | 3 | .2 | 226 | 13.6 | 223 | 13.4 |
| 1987..... | 16,610 | 5 | .3 | 225 | 13.6 | 220 | 13.3 |
| 1988..... | 16,597 | 6 | .4 | 223 | 13.4 | 217 | 13.1 |
| 1989..... | 16,586 | 6 | .4 | 220 | 13.3 | 215 | 12.9 |
| 1990..... | 16,578 | 4 | .3 | 217 | 13.1 | 212 | 12.8 |
| 1995..... | 16,542 | -6 | -.4 | 193 | 11.6 | 199 | 12.0 |
| 2000..... | 16,539 | 6 | .4 | 199 | 12.0 | 193 | 11.7 |
| 2005..... | 16,565 | 4 | .2 | 206 | 12.4 | 202 | 12.2 |
| 2010..... | 16,559 | -8 | -.5 | 202 | 12.2 | 210 | 12.7 |
| Low series: | | | | | | | |
| 1986..... | 16,622 | -8 | -.5 | 215 | 12.9 | 223 | 13.4 |
| 1987..... | 16,593 | -8 | -.5 | 212 | 12.8 | 220 | 13.3 |
| 1988..... | 16,565 | -9 | -.5 | 208 | 12.6 | 217 | 13.1 |
| 1989..... | 16,539 | -10 | -.6 | 204 | 12.3 | 214 | 13.0 |
| 1990..... | 16,514 | -13 | -.8 | 199 | 12.0 | 212 | 12.8 |
| 1995..... | 16,375 | -30 | -1.8 | 169 | 10.3 | 199 | 12.1 |
| 2000..... | 16,238 | -25 | -1.6 | 167 | 10.3 | 193 | 11.9 |
| 2005..... | 16,104 | -30 | -1.8 | 172 | 10.7 | 202 | 12.5 |
| 2010..... | 15,918 | -47 | -3.0 | 163 | 10.2 | 210 | 13.2 |
| Constant series: | | | | | | | |
| 1986..... | 16,628 | 3 | .2 | 226 | 13.6 | 223 | 13.4 |
| 1987..... | 16,610 | 3 | .2 | 224 | 13.5 | 220 | 13.3 |
| 1988..... | 16,594 | 3 | .2 | 220 | 13.3 | 217 | 13.1 |
| 1989..... | 16,580 | 1 | .1 | 216 | 13.0 | 215 | 12.9 |

TABLE I-E.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—GERMAN DEMOCRATIC REPUBLIC: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|-----------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| 1990..... | 16,566 | -1 | -.1 | 211 | 12.7 | 212 | 12.8 |
| 1995..... | 16,487 | -17 | -.1.1 | 181 | 11.0 | 199 | 12.1 |
| 2000..... | 16,415 | -11 | -.7 | 181 | 11.1 | 193 | 11.7 |
| 2005..... | 16,353 | -14 | -.9 | 187 | 11.5 | 202 | 12.3 |
| 2010..... | 16,254 | -28 | -1.7 | 182 | 11.2 | 210 | 12.9 |

¹ The official population totals for the years 1951–64 have been revised downward here to account for the difference of approximately 212,000 between the Dec. 31, 1964 Census total of 17,003,632 and the unrevised population estimate for that date. The revised estimates are based on the Aug. 31, 1950 census total of 18,388,172; reported births and deaths; and adjustments to the implied annual net emigration figures so as to be consistent with the 1964 census total. The official midyear population figure for 1970 was adjusted downward slightly to be consistent with the Jan. 1, 1971 census total of 17,068,318. The adjusted estimate was based on the 1971 census figure and the estimated net population change for the last half of 1970.

² Rates for the years 1951–64 and 1970 are based on the published numbers of births and deaths and the revised midyear population totals. See footnote 1 above.

³ Census of Aug. 31, 1950.

TABLE I-F.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—HUNGARY: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series.]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|----------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| Estimates | | | | | | | |
| 1950..... | 9,338 | 89 | 9.5 | 196 | 20.9 | 107 | 11.4 |
| 1955..... | 9,825 | 113 | 11.5 | 210 | 21.4 | 98 | 10.0 |
| 1960..... | 9,984 | 45 | 4.5 | 146 | 14.7 | 102 | 10.2 |
| 1965..... | 10,153 | 25 | 2.5 | 133 | 13.1 | 108 | 10.6 |
| 1970..... | 10,337 | 32 | 3.1 | 152 | 14.7 | 120 | 11.6 |
| 1975..... | 10,532 | 63 | 6.0 | 194 | 18.4 | 131 | 12.4 |
| 1980..... | 10,711 | 3 | .3 | 149 | 13.9 | 145 | 13.6 |
| 1981..... | 10,712 | -2 | -.2 | 143 | 13.3 | 145 | 13.5 |
| 1982..... | 10,706 | -11 | -1.0 | 134 | 12.5 | 144 | 13.5 |
| 1983..... | 10,689 | -21 | -2.0 | 127 | 11.9 | 149 | 13.9 |
| 1984..... | 10,668 | -21 | -2.0 | 125 | 11.8 | 147 | 13.8 |
| 1985..... | 10,649 | -17 | -1.6 | 130 | 12.2 | 148 | 13.9 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 10,633 | -14 | -1.3 | 135 | 12.7 | 148 | 13.9 |
| 1987..... | 10,619 | -14 | -1.3 | 135 | 12.7 | 149 | 14.0 |
| 1988..... | 10,606 | -13 | -1.2 | 136 | 12.8 | 149 | 14.1 |
| 1989..... | 10,593 | -12 | -1.1 | 138 | 13.0 | 150 | 14.2 |
| 1990..... | 10,582 | -11 | -1.0 | 140 | 13.2 | 151 | 14.2 |
| 1995..... | 10,577 | 10 | .9 | 155 | 14.6 | 145 | 13.7 |
| 2000..... | 10,677 | 25 | 2.3 | 166 | 15.5 | 140 | 13.2 |
| 2005..... | 10,776 | 14 | 1.3 | 155 | 14.3 | 141 | 13.1 |
| 2010..... | 10,831 | 10 | .9 | 148 | 13.7 | 139 | 12.8 |
| Medium series: | | | | | | | |
| 1986..... | 10,630 | -20 | -1.9 | 128 | 12.1 | 148 | 13.9 |
| 1987..... | 10,609 | -21 | -2.0 | 128 | 12.0 | 149 | 14.0 |
| 1988..... | 10,588 | -21 | -2.0 | 128 | 12.1 | 149 | 14.1 |
| 1989..... | 10,567 | -21 | -2.0 | 128 | 12.1 | 150 | 14.2 |
| 1990..... | 10,546 | -21 | -2.0 | 129 | 12.3 | 150 | 14.3 |

TABLE I-F.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—HUNGARY: 1950–2010—Continued

(Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series)

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|------------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| 1995..... | 10,474 | -7 | -6 | 138 | 13.2 | 145 | 13.8 |
| 2000..... | 10,477 | 3 | .3 | 143 | 13.6 | 140 | 13.4 |
| 2005..... | 10,466 | -8 | -8 | 132 | 12.7 | 140 | 13.4 |
| 2010..... | 10,408 | -15 | -1.4 | 124 | 11.9 | 138 | 13.3 |
| Low series: | | | | | | | |
| 1986..... | 10,627 | -26 | -2.5 | 122 | 11.5 | 148 | 13.9 |
| 1987..... | 10,599 | -28 | -2.7 | 120 | 11.3 | 148 | 14.0 |
| 1988..... | 10,571 | -30 | -2.8 | 119 | 11.3 | 149 | 14.1 |
| 1989..... | 10,540 | -31 | -2.9 | 119 | 11.3 | 150 | 14.2 |
| 1990..... | 10,509 | -31 | -3.0 | 119 | 11.3 | 150 | 14.3 |
| 1995..... | 10,372 | -23 | -2.2 | 122 | 11.7 | 145 | 13.9 |
| 2000..... | 10,278 | -19 | -1.9 | 120 | 11.7 | 140 | 13.6 |
| 2005..... | 10,158 | -29 | -2.9 | 111 | 10.9 | 140 | 13.8 |
| 2010..... | 9,989 | -38 | -3.8 | 100 | 10.0 | 138 | 13.8 |
| Constant series: | | | | | | | |
| 1986..... | 10,630 | -20 | -1.9 | 128 | 12.1 | 148 | 13.9 |
| 1987..... | 10,609 | -21 | -2.0 | 127 | 12.0 | 149 | 14.0 |
| 1988..... | 10,588 | -22 | -2.1 | 127 | 12.0 | 149 | 14.1 |
| 1989..... | 10,566 | -22 | -2.1 | 127 | 12.1 | 150 | 14.2 |
| 1990..... | 10,543 | -22 | -2.1 | 128 | 12.2 | 150 | 14.3 |
| 1995..... | 10,462 | -10 | -9 | 135 | 12.9 | 145 | 13.8 |
| 2000..... | 10,446 | -2 | -2 | 138 | 13.2 | 140 | 13.4 |
| 2005..... | 10,413 | -12 | -1.2 | 128 | 12.3 | 140 | 13.5 |
| 2010..... | 10,333 | -19 | -1.8 | 119 | 11.5 | 138 | 13.4 |

TABLE I-G.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—POLAND: 1950–2010

(Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series)

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|--------------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| Estimates | | | | | | | |
| 1950..... | 24,824 | 474 | 19.1 | 763 | 30.7 | 289 | 11.6 |
| 1955..... | 27,221 | 532 | 19.6 | 794 | 29.2 | 262 | 9.6 |
| 1960..... | 29,590 | 445 | 15.0 | 669 | 22.6 | 224 | 7.6 |
| 1965..... | 31,262 | 314 | 10.0 | 546 | 17.5 | 232 | 7.4 |
| 1970..... | 32,526 | 279 | 8.6 | 546 | 16.8 | 267 | 8.2 |
| 1975..... | 33,969 | 347 | 10.2 | 644 | 19.0 | 297 | 8.7 |
| 1980..... | 35,578 | 343 | 9.6 | 693 | 19.5 | 350 | 9.8 |
| 1981..... | 35,902 | 350 | 9.7 | 679 | 18.9 | 329 | 9.2 |
| 1982..... | 36,227 | 367 | 10.1 | 702 | 19.4 | 335 | 9.2 |
| 1983..... | 36,571 | 371 | 10.2 | 721 | 19.7 | 349 | 9.6 |
| 1984..... | 36,914 | 334 | 9.1 | 699 | 18.9 | 365 | 9.9 |
| 1985..... | 37,203 | 296 | 8.0 | 678 | 18.2 | 381 | 10.3 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 37,490 | 314 | 8.4 | 701 | 18.7 | 386 | 10.3 |
| 1987..... | 37,778 | 293 | 7.8 | 684 | 18.1 | 391 | 10.4 |
| 1988..... | 38,046 | 273 | 7.2 | 668 | 17.6 | 396 | 10.4 |

TABLE I-G.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—POLAND: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population ¹ | Natural increase | | Births | | Deaths | |
|------------------|---------------------------------|------------------|-------------------|--------|-------------------|--------|-------------------|
| | | Number | Rate ² | Number | Rate ² | Number | Rate ² |
| 1989..... | 38,298 | 254 | 6.6 | 654 | 17.1 | 400 | 10.4 |
| 1990..... | 38,534 | 239 | 6.2 | 642 | 16.7 | 404 | 10.5 |
| 1995..... | 39,623 | 215 | 5.4 | 620 | 15.6 | 405 | 10.2 |
| 2000..... | 40,729 | 225 | 5.5 | 636 | 15.6 | 411 | 10.1 |
| 2005..... | 41,910 | 245 | 5.8 | 678 | 16.2 | 433 | 10.3 |
| 2010..... | 43,142 | 243 | 5.6 | 692 | 16.0 | 449 | 10.4 |
| Medium series: | | | | | | | |
| 1986..... | 37,473 | 281 | 7.5 | 667 | 17.8 | 386 | 10.3 |
| 1987..... | 37,727 | 257 | 6.8 | 648 | 17.2 | 390 | 10.3 |
| 1988..... | 37,958 | 234 | 6.2 | 629 | 16.6 | 395 | 10.4 |
| 1989..... | 38,170 | 213 | 5.6 | 611 | 16.0 | 399 | 10.4 |
| 1990..... | 38,363 | 194 | 5.1 | 597 | 15.6 | 403 | 10.5 |
| 1995..... | 39,187 | 153 | 3.9 | 556 | 14.2 | 403 | 10.3 |
| 2000..... | 39,926 | 140 | 3.5 | 550 | 13.8 | 410 | 10.3 |
| 2005..... | 40,663 | 152 | 3.7 | 584 | 14.4 | 432 | 10.6 |
| 2010..... | 41,392 | 135 | 3.3 | 582 | 14.0 | 447 | 10.8 |
| Low series: | | | | | | | |
| 1986..... | 37,457 | 248 | 6.6 | 634 | 16.9 | 386 | 10.3 |
| 1987..... | 37,676 | 221 | 5.9 | 611 | 16.2 | 390 | 10.3 |
| 1988..... | 37,870 | 195 | 5.2 | 589 | 15.6 | 394 | 10.4 |
| 1989..... | 38,042 | 171 | 4.5 | 569 | 15.0 | 398 | 10.5 |
| 1990..... | 38,192 | 149 | 3.9 | 551 | 14.4 | 402 | 10.5 |
| 1995..... | 38,750 | 91 | 2.3 | 493 | 12.7 | 402 | 10.4 |
| 2000..... | 39,123 | 55 | 1.4 | 463 | 11.8 | 408 | 10.4 |
| 2005..... | 39,416 | 60 | 1.5 | 489 | 12.4 | 430 | 10.9 |
| 2010..... | 39,658 | 32 | .8 | 476 | 12.0 | 445 | 11.2 |
| Constant series: | | | | | | | |
| 1986..... | 37,473 | 281 | 7.5 | 667 | 17.8 | 386 | 10.3 |
| 1987..... | 37,731 | 266 | 7.0 | 656 | 17.4 | 391 | 10.4 |
| 1988..... | 37,975 | 251 | 6.6 | 646 | 17.0 | 395 | 10.4 |
| 1989..... | 38,207 | 237 | 6.2 | 637 | 16.7 | 399 | 10.4 |
| 1990..... | 38,429 | 226 | 5.9 | 630 | 16.4 | 403 | 10.5 |
| 1995..... | 39,515 | 226 | 5.7 | 631 | 16.0 | 405 | 10.2 |
| 2000..... | 40,739 | 262 | 6.4 | 674 | 16.5 | 412 | 10.1 |
| 2005..... | 42,107 | 283 | 6.7 | 717 | 17.0 | 434 | 10.3 |
| 2010..... | 43,509 | 274 | 6.3 | 723 | 16.6 | 449 | 10.3 |

¹ The official population totals for the years 1951–78 have been revised downward here to account for the differences of approximately 123,000, 95,000, and 112,000 between the 1960, 1970, and 1978 census totals and the unrevised population estimates for those years. The revised estimates are based on the Dec. 3, 1950 census total of 25,008,179; reported births, deaths, and net migration; and intercensal adjustments necessary to be consistent with the Dec. 6, 1960 census total of 29,775,508; the Dec. 8, 1970 census total of 32,642,270; and the Dec. 7, 1978 census total of 35,061,450.

² Rates for the years 1951–78 are based on published numbers of births and deaths and the revised population totals. See footnote 1 above.

TABLE I-H.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—ROMANIA: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|-----------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| Estimates | | | | | | | |
| 1950..... | 16,311 | 225 | 13.8 | 427 | 26.2 | 202 | 12.4 |

TABLE I-H.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—ROMANIA: 1950–2010—Continued

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|------------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| 1955..... | 17,325 | 275 | 15.9 | 443 | 25.6 | 168 | 9.7 |
| 1960..... | 18,403 | 192 | 10.4 | 352 | 19.1 | 161 | 8.7 |
| 1965..... | 19,027 | 115 | 6.0 | 278 | 14.6 | 163 | 8.6 |
| 1970..... | 20,253 | 234 | 11.5 | 427 | 21.1 | 193 | 9.5 |
| 1975..... | 21,245 | 221 | 10.4 | 418 | 19.7 | 198 | 9.3 |
| 1980..... | 22,201 | 167 | 7.5 | 399 | 18.0 | 232 | 10.4 |
| 1981..... | 22,353 | 156 | 7.0 | 381 | 17.0 | 225 | 10.0 |
| 1982..... | 22,478 | 120 | 5.3 | 344 | 15.3 | 224 | 10.0 |
| 1983..... | 22,553 | 88 | 3.9 | 321 | 14.3 | 234 | 10.4 |
| 1984..... | 22,625 | 117 | 5.2 | 351 | 15.5 | 234 | 10.3 |
| 1985..... | 22,727 | 112 | 4.9 | 359 | 15.8 | 247 | 10.9 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 22,844 | 140 | 6.1 | 378 | 16.5 | 238 | 10.4 |
| 1987..... | 22,964 | 133 | 5.8 | 375 | 16.3 | 242 | 10.5 |
| 1988..... | 23,089 | 146 | 6.3 | 391 | 17.0 | 245 | 10.6 |
| 1989..... | 23,226 | 152 | 6.5 | 400 | 17.2 | 249 | 10.7 |
| 1990..... | 23,369 | 154 | 6.6 | 407 | 17.4 | 253 | 10.8 |
| 1995..... | 24,128 | 154 | 6.4 | 412 | 17.1 | 258 | 10.7 |
| 2000..... | 24,893 | 141 | 5.7 | 404 | 16.2 | 262 | 10.5 |
| 2005..... | 25,530 | 110 | 4.3 | 389 | 15.2 | 279 | 10.9 |
| 2010..... | 26,067 | 107 | 4.1 | 395 | 15.2 | 288 | 11.0 |
| Medium series: | | | | | | | |
| 1986..... | 22,835 | 122 | 5.4 | 360 | 15.8 | 238 | 10.4 |
| 1987..... | 22,937 | 114 | 5.0 | 355 | 15.5 | 241 | 10.5 |
| 1988..... | 23,041 | 124 | 5.4 | 368 | 16.0 | 245 | 10.6 |
| 1989..... | 23,153 | 126 | 5.5 | 374 | 16.2 | 248 | 10.7 |
| 1990..... | 23,269 | 126 | 5.4 | 378 | 16.3 | 252 | 10.8 |
| 1995..... | 23,855 | 113 | 4.7 | 369 | 15.5 | 257 | 10.8 |
| 2000..... | 24,381 | 88 | 3.6 | 349 | 14.3 | 261 | 10.7 |
| 2005..... | 24,748 | 56 | 2.3 | 334 | 13.5 | 277 | 11.2 |
| 2010..... | 24,992 | 43 | 1.7 | 329 | 13.2 | 286 | 11.5 |
| Low series: | | | | | | | |
| 1986..... | 22,826 | 104 | 4.6 | 342 | 15.0 | 237 | 10.4 |
| 1987..... | 22,909 | 94 | 4.1 | 335 | 14.6 | 241 | 10.5 |
| 1988..... | 22,992 | 101 | 4.4 | 345 | 15.0 | 244 | 10.6 |
| 1989..... | 23,081 | 101 | 4.4 | 348 | 15.1 | 247 | 10.7 |
| 1990..... | 23,170 | 98 | 4.2 | 349 | 15.1 | 252 | 10.9 |
| 1995..... | 23,582 | 71 | 3.0 | 327 | 13.9 | 256 | 10.8 |
| 2000..... | 23,869 | 34 | 1.4 | 294 | 12.3 | 259 | 10.9 |
| 2005..... | 23,968 | 3 | .1 | 279 | 11.6 | 276 | 11.5 |
| 2010..... | 23,930 | -18 | -.7 | 267 | 11.2 | 285 | 11.9 |
| Constant series: | | | | | | | |
| 1986..... | 22,835 | 122 | 5.4 | 360 | 15.8 | 238 | 10.4 |
| 1987..... | 22,939 | 118 | 5.1 | 359 | 15.7 | 241 | 10.5 |
| 1988..... | 23,050 | 133 | 5.8 | 378 | 16.4 | 245 | 10.6 |
| 1989..... | 23,174 | 140 | 6.1 | 389 | 16.8 | 248 | 10.7 |
| 1990..... | 23,307 | 145 | 6.2 | 398 | 17.1 | 253 | 10.9 |
| 1995..... | 24,055 | 158 | 6.6 | 416 | 17.3 | 258 | 10.7 |
| 2000..... | 24,877 | 160 | 6.4 | 422 | 17.0 | 263 | 10.6 |
| 2005..... | 25,600 | 126 | 4.9 | 406 | 15.8 | 279 | 10.9 |
| 2010..... | 26,204 | 119 | 4.5 | 407 | 15.5 | 288 | 11.0 |

TABLE I-I.—ESTIMATED AND PROJECTED TOTAL POPULATION, COMPONENTS OF POPULATION CHANGE, AND VITAL RATES—YUGOSLAVIA: 1950–2010

[Absolute numbers in thousands; rates per thousand population; differences between natural increase and year-to-year changes in the population estimates are due in varying degrees, to differences in time periods (calendar year versus midyear-to-midyear), to migration, and to discrepancies in the reporting systems; natural increase may not equal the difference between births and deaths due to rounding; see text for an explanation of the series]

| Year | Midyear population | Natural increase | | Births | | Deaths | |
|-----------------------|--------------------|------------------|------|--------|------|--------|------|
| | | Number | Rate | Number | Rate | Number | Rate |
| Estimates | | | | | | | |
| 1950..... | 16,346 | 282 | 17.3 | 494 | 30.2 | 212 | 13.0 |
| 1955..... | 17,519 | 271 | 15.5 | 471 | 26.9 | 200 | 11.4 |
| 1960..... | 18,402 | 250 | 13.6 | 433 | 23.5 | 183 | 9.9 |
| 1965..... | 19,434 | 238 | 12.2 | 408 | 21.0 | 171 | 8.8 |
| 1970..... | 20,371 | 181 | 8.9 | 363 | 17.8 | 182 | 8.9 |
| 1975..... | 21,347 | 203 | 9.5 | 388 | 18.2 | 185 | 8.7 |
| 1980..... | 22,304 | 185 | 8.3 | 382 | 17.1 | 197 | 8.8 |
| 1981..... | 22,471 | 168 | 7.5 | 369 | 16.4 | 201 | 9.0 |
| 1982..... | 22,642 | 176 | 7.8 | 379 | 16.7 | 203 | 9.0 |
| 1983..... | 22,801 | 156 | 6.8 | 375 | 16.4 | 219 | 9.6 |
| 1984..... | 22,963 | 163 | 7.1 | 377 | 16.4 | 215 | 9.4 |
| 1985..... | 23,123 | 156 | 6.8 | 367 | 15.9 | 211 | 9.1 |
| Projections | | | | | | | |
| High series: | | | | | | | |
| 1986..... | 23,287 | 173 | 7.4 | 387 | 16.6 | 214 | 9.2 |
| 1987..... | 23,459 | 172 | 7.3 | 378 | 16.5 | 216 | 9.2 |
| 1988..... | 23,630 | 170 | 7.2 | 388 | 16.4 | 218 | 9.2 |
| 1989..... | 23,799 | 168 | 7.1 | 388 | 16.3 | 220 | 9.2 |
| 1990..... | 23,965 | 164 | 6.9 | 387 | 16.1 | 223 | 9.3 |
| 1995..... | 24,767 | 156 | 6.3 | 389 | 15.7 | 233 | 9.4 |
| 2000..... | 25,539 | 148 | 5.8 | 393 | 15.4 | 245 | 9.6 |
| 2005..... | 26,208 | 121 | 4.6 | 392 | 15.0 | 271 | 10.4 |
| 2010..... | 26,761 | 103 | 3.8 | 394 | 14.7 | 291 | 10.9 |
| Medium series: | | | | | | | |
| 1986..... | 23,278 | 155 | 6.7 | 368 | 15.8 | 213 | 9.2 |
| 1987..... | 23,431 | 152 | 6.5 | 367 | 15.7 | 215 | 9.2 |
| 1988..... | 23,580 | 147 | 6.2 | 364 | 15.5 | 217 | 9.2 |
| 1989..... | 23,725 | 143 | 6.0 | 362 | 15.2 | 219 | 9.2 |
| 1990..... | 23,864 | 137 | 5.7 | 359 | 15.0 | 222 | 9.3 |
| 1995..... | 24,498 | 116 | 4.7 | 348 | 14.2 | 232 | 9.5 |
| 2000..... | 25,040 | 96 | 3.8 | 340 | 13.6 | 244 | 9.7 |
| 2005..... | 25,443 | 66 | 2.6 | 336 | 13.2 | 270 | 10.6 |
| 2010..... | 25,707 | 40 | 1.6 | 330 | 12.8 | 290 | 11.3 |
| Low series: | | | | | | | |
| 1986..... | 23,268 | 137 | 5.9 | 350 | 15.0 | 213 | 9.2 |
| 1987..... | 23,402 | 131 | 5.6 | 346 | 14.8 | 215 | 9.2 |
| 1988..... | 23,530 | 124 | 5.3 | 341 | 14.5 | 217 | 9.2 |
| 1989..... | 23,651 | 117 | 5.0 | 336 | 14.2 | 218 | 9.2 |
| 1990..... | 23,764 | 109 | 4.6 | 330 | 13.9 | 221 | 9.3 |
| 1995..... | 24,229 | 76 | 3.1 | 307 | 12.7 | 231 | 9.5 |
| 2000..... | 24,540 | 44 | 1.8 | 286 | 11.7 | 242 | 9.9 |
| 2005..... | 24,680 | 13 | .5 | 282 | 11.4 | 269 | 10.9 |
| 2010..... | 24,663 | -19 | -.8 | 269 | 10.9 | 289 | 11.7 |

Constant series:

| | | | | | | | |
|-----------|--------|-----|-----|-----|------|-----|------|
| 1986..... | 23,278 | 155 | 6.7 | 368 | 15.8 | 213 | 9.2 |
| 1987..... | 23,432 | 154 | 6.6 | 369 | 15.7 | 215 | 9.2 |
| 1988..... | 23,584 | 151 | 6.4 | 368 | 15.6 | 217 | 9.2 |
| 1989..... | 23,734 | 148 | 6.2 | 367 | 15.4 | 219 | 9.2 |
| 1990..... | 23,880 | 144 | 6.0 | 336 | 15.3 | 222 | 9.3 |
| 1995..... | 24,576 | 133 | 5.4 | 366 | 14.9 | 232 | 9.5 |
| 2000..... | 25,228 | 123 | 4.9 | 367 | 14.6 | 244 | 9.7 |
| 2005..... | 25,766 | 94 | 3.6 | 364 | 14.1 | 271 | 10.5 |
| 2010..... | 26,168 | 69 | 2.6 | 359 | 13.7 | 291 | 11.1 |

¹ The official population totals for the years 1971-79 have been revised downward here to account for the difference of approximately 40,000 between the 1981 census and the unrevised population estimate for that year. The revised estimates are based on the Mar. 31, 1971 census total of 20,522,572 and adjustments to the official annual population figures so as to be consistent with the Mar. 31, 1981 census total of 22,424,711.

² Rates for the years 1971-79 are based on the published numbers of births and deaths and the revised midyear population totals. See footnote 1 above.

TABLE II-A.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--EIGHT EASTERN EUROPEAN COUNTRIES COMBINED, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | |
|-------------------|------------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | |
| All ages: | | | | | | | | | | | | | | | | | | | |
| High..... | 137,735 | 141,147 | 144,578 | 148,296 | 151,846 | 155,078 | 67,305 | 69,054 | 70,849 | 72,769 | 74,608 | 76,293 | 70,450 | 72,092 | 73,729 | 75,528 | 77,238 | 78,785 | |
| Medium..... | | 140,561 | 143,023 | 145,404 | 147,398 | 148,915 | | 68,754 | 70,051 | 71,284 | 72,326 | 73,130 | | | | | | | |
| Low..... | | 139,975 | 141,467 | 142,511 | 142,956 | 142,813 | | 68,453 | 69,252 | 69,799 | 70,046 | 70,000 | | | | | | | |
| Constant..... | | 140,696 | 143,713 | 147,111 | 150,375 | 153,219 | | 68,823 | 70,406 | 72,162 | 73,856 | 75,343 | | 71,873 | 73,307 | 74,949 | 76,519 | 77,876 | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 10,658 | 11,016 | 11,025 | 11,240 | 11,408 | 11,461 | 5,571 | 5,656 | 5,661 | 5,771 | 5,858 | 5,887 | 5,288 | 5,360 | 5,364 | 5,468 | 5,549 | 5,574 | |
| Medium..... | | 10,430 | 10,053 | 9,900 | 9,846 | 9,738 | | 5,355 | 5,162 | 5,083 | 5,057 | 5,002 | | | | | | | |
| Low..... | | 9,845 | 9,081 | 8,559 | 8,292 | 8,070 | | 5,054 | 4,663 | 4,395 | 4,259 | 4,145 | | | | | | | |
| Constant..... | | 10,565 | 10,610 | 10,918 | 11,121 | 11,073 | | 5,424 | 5,448 | 5,607 | 5,712 | 5,688 | | 5,141 | 5,162 | 5,311 | 5,409 | 5,584 | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 11,355 | 10,805 | 10,975 | 10,995 | 11,214 | 11,385 | 5,817 | 5,540 | 5,632 | 5,643 | 5,755 | 5,844 | 5,338 | 5,265 | 5,343 | 5,352 | 5,458 | 5,541 | |
| Medium..... | | | 10,391 | 10,026 | 9,876 | 9,826 | | | 5,332 | 5,145 | 5,069 | 5,044 | | | | | | | |
| Low..... | | | 9,808 | 9,057 | 8,539 | 8,275 | | | 5,033 | 4,648 | 4,383 | 4,248 | | | | | | | |
| Constant..... | | | 10,525 | 10,580 | 10,891 | 11,098 | | | 5,401 | 5,430 | 5,591 | 5,698 | | | 5,124 | 5,150 | 5,301 | 5,400 | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 10,603 | 11,324 | 10,783 | 10,958 | 10,980 | 11,200 | 5,432 | 5,798 | 5,526 | 5,621 | 5,633 | 5,746 | 5,171 | 5,526 | 5,257 | 5,337 | 5,347 | 5,454 | |
| Medium..... | | | | 10,430 | 10,012 | 9,865 | | | | 5,322 | 5,136 | 5,061 | | | | | | | |
| Low..... | | | | 9,793 | 9,044 | 8,529 | | | | 5,023 | 4,640 | 4,376 | | | | | | | |
| Constant..... | | | | 10,509 | 10,566 | 10,878 | | | | 5,391 | 5,421 | 5,582 | | | | 5,119 | 5,145 | 5,296 | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 10,248 | 10,566 | 11,294 | 10,760 | 10,938 | 10,961 | 5,246 | 5,409 | 5,778 | 5,510 | 5,606 | 5,619 | 5,003 | 5,157 | 5,516 | 5,250 | 5,332 | 5,342 | |
| Medium..... | | | | | 10,356 | 9,996 | | | | | 5,308 | 5,124 | | | | | 5,054 | 4,876 | |
| Low..... | | | | | 9,774 | 9,029 | | | | | 5,010 | 4,629 | | | | | 4,770 | 4,405 | |
| Constant..... | | | | | 10,489 | 10,548 | | | | | 5,376 | 5,408 | | | | | 5,119 | 5,145 | 5,296 |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 10,080 | 10,186 | 10,520 | 11,255 | 10,727 | 10,907 | 5,163 | 5,206 | 5,376 | 5,749 | 5,485 | 5,583 | 4,918 | 4,980 | 5,143 | 5,506 | 5,242 | 5,324 | |
| Medium..... | | | | | | 10,327 | | | | | | 9,747 | | | | | | 5,286 | 4,989 |
| Low..... | | | | | | 10,460 | | | | | | 5,354 | | | | | | 4,989 | 4,788 |
| Constant..... | | | | | | 10,080 | | | | | | 10,186 | | | | | | 10,520 | 11,255 |
| 25 to 29 years... | 11,015 | 9,997 | 10,126 | 10,474 | 11,211 | 10,689 | 5,623 | 5,107 | 5,163 | 5,342 | 5,715 | 5,435 | 4,918 | 4,980 | 5,143 | 5,506 | 5,242 | 5,324 | |
| 30 to 34 years... | 11,235 | 10,918 | 9,928 | 10,071 | 10,422 | 11,161 | 5,700 | 5,555 | 5,058 | 5,123 | 5,304 | 5,678 | 5,335 | 4,889 | 4,962 | 5,132 | 5,496 | 5,233 | |
| 35 to 39 years... | 9,419 | 11,116 | 10,819 | 9,852 | 10,002 | 10,358 | 4,745 | 5,616 | 5,484 | 5,003 | 5,073 | 5,286 | 4,674 | 4,889 | 4,962 | 5,132 | 5,496 | 5,483 | |
| 40 to 44 years... | 7,880 | 9,278 | 10,967 | 10,689 | 9,747 | 9,904 | 3,919 | 4,645 | 5,510 | 5,391 | 4,928 | 5,003 | 3,960 | 4,889 | 4,962 | 5,132 | 5,496 | 5,101 | |
| 45 to 49 years... | 8,414 | 7,702 | 9,084 | 10,756 | 10,498 | 9,588 | 4,140 | 3,795 | 4,508 | 5,360 | 5,253 | 4,814 | 4,274 | 3,907 | 4,576 | 5,396 | 5,243 | 4,901 | |
| 50 to 54 years... | 8,226 | 8,130 | 7,454 | 8,810 | 10,449 | 10,215 | 4,018 | 3,945 | 3,623 | 4,316 | 5,145 | 5,056 | 4,208 | 4,185 | 3,830 | 4,494 | 5,304 | 5,159 | |
| 55 to 59 years... | 7,706 | 7,806 | 7,736 | 7,109 | 8,423 | 10,009 | 3,605 | 3,734 | 3,680 | 3,389 | 4,050 | 4,841 | 4,101 | 4,071 | 4,057 | 3,720 | 4,373 | 5,168 | |
| 60 to 64 years... | 6,624 | 7,123 | 7,235 | 7,202 | 6,634 | 7,085 | 2,870 | 3,234 | 3,363 | 3,331 | 3,076 | 3,691 | 3,754 | 3,889 | 3,872 | 3,871 | 3,558 | 4,194 | |
| 65 to 69 years... | 3,690 | 5,863 | 6,330 | 6,437 | 6,458 | 5,967 | 1,534 | 2,429 | 2,797 | 2,883 | 2,872 | 2,661 | 2,157 | 3,434 | 3,573 | 3,574 | 3,586 | 3,305 | |
| 70 to 74 years... | 4,478 | 3,046 | 4,863 | 5,279 | 5,408 | 5,441 | 1,790 | 1,189 | 1,894 | 2,172 | 2,285 | 2,292 | 2,688 | 1,857 | 2,969 | 3,107 | 3,123 | 3,149 | |
| 75 to 79 years... | 3,323 | 3,263 | 2,260 | 3,621 | 3,954 | 4,071 | 1,266 | 1,201 | 813 | 1,303 | 1,510 | 1,599 | 2,057 | 2,062 | 1,447 | 2,319 | 2,444 | 2,472 | |
| 80 years and over | 2,600 | 3,009 | 3,181 | 2,768 | 3,374 | 3,876 | 867 | 996 | 1,024 | 861 | 1,057 | 1,266 | 1,733 | 2,013 | 2,198 | 1,907 | 2,317 | 2,610 | |

TABLE II-B.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--ALBANIA, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | | | |
|-------------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-----|-----|-----|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | | |
| All ages: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 2,963 | 3,287 | 3,595 | 3,867 | 4,117 | 4,369 | 1,524 | 1,690 | 1,846 | 1,984 | 2,109 | 2,235 | 1,438 | 1,597 | 1,748 | 1,883 | 2,008 | 2,134 | | | |
| Medium..... | | 3,268 | 3,548 | 3,792 | 4,013 | 4,229 | | 1,680 | 1,822 | 1,945 | 2,065 | 2,162 | | 1,588 | 1,726 | 1,847 | 1,958 | 2,067 | | | |
| Low..... | | 3,248 | 3,501 | 3,715 | 3,907 | 4,088 | | 1,670 | 1,798 | 1,905 | 2,000 | 2,089 | | 1,579 | 1,703 | 1,810 | 1,907 | 1,999 | | | |
| Constant..... | | 3,287 | 3,645 | 4,019 | 4,398 | 4,787 | | 1,690 | 1,872 | 2,063 | 2,255 | 2,452 | | 1,597 | 1,773 | 1,956 | 2,142 | 2,333 | | | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 352 | 390 | 383 | 358 | 348 | 362 | 183 | 203 | 199 | 186 | 181 | 189 | 169 | 187 | 184 | 172 | 167 | 174 | | | |
| Medium..... | | 371 | 356 | 329 | 318 | 327 | | 193 | 185 | 171 | 165 | 170 | | 178 | 171 | 158 | 152 | 167 | | | |
| Low..... | | 351 | 328 | 300 | 288 | 292 | | 183 | 171 | 156 | 150 | 152 | | 168 | 157 | 144 | 138 | 140 | | | |
| Constant..... | | 390 | 434 | 460 | 477 | 501 | | 203 | 226 | 239 | 248 | 261 | | 187 | 208 | 221 | 229 | 240 | | | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 325 | 349 | 387 | 380 | 355 | 345 | 170 | 181 | 201 | 198 | 185 | 180 | 156 | 167 | 186 | 182 | 171 | 166 | | | |
| Medium..... | | | 368 | 353 | 327 | 315 | | | 191 | 184 | 170 | 164 | | | 177 | 169 | 157 | 151 | | | |
| Low..... | | | 348 | 325 | 298 | 286 | | | 181 | 169 | 155 | 149 | | | 167 | 156 | 143 | 137 | | | |
| Constant..... | | | 387 | 430 | 457 | 474 | | | 201 | 224 | 237 | 246 | | | 186 | 207 | 219 | 227 | | | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 325 | 325 | 348 | 386 | 379 | 355 | 169 | 169 | 181 | 201 | 197 | 184 | 156 | 156 | 167 | 186 | 182 | 170 | | | |
| Medium..... | | | | 367 | 352 | 326 | | | | 191 | 183 | 170 | | | | 176 | 169 | 157 | | | |
| Low..... | | | | 348 | 325 | 297 | | | | 181 | 169 | 154 | | | | 167 | 156 | 143 | | | |
| Constant..... | | | | 386 | 429 | 456 | | | | 201 | 223 | 237 | | | | 186 | 206 | 219 | | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 313 | 324 | 324 | 347 | 386 | 379 | 161 | 168 | 169 | 180 | 200 | 197 | 152 | 156 | 155 | 167 | 185 | 182 | | | |
| Medium..... | | | | | 366 | 352 | | | | | 190 | 183 | | | | | 170 | 176 | 169 | 157 | |
| Low..... | | | | | 347 | 324 | | | | | 180 | 168 | | | | | 156 | 151 | 167 | 156 | 143 |
| Constant..... | | | | | 385 | 429 | | | | | 200 | 223 | | | | | 185 | 206 | 219 | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 299 | 312 | 323 | 323 | 346 | 385 | 154 | 160 | 168 | 168 | 180 | 200 | 144 | 152 | 155 | 155 | 167 | 185 | | | |
| Medium..... | | | | | | 366 | | | | | | 190 | | | | | | 180 | 176 | 167 | |
| Low..... | | | | | | 346 | | | | | | 180 | | | | | | 168 | 155 | 151 | |
| Constant..... | | | | | | 385 | | | | | | 199 | | | | | | 185 | 206 | 219 | |
| 25 to 29 years... | 268 | 298 | 311 | 322 | 322 | 345 | 139 | 154 | 159 | 167 | 168 | 179 | 130 | 144 | 152 | 155 | 155 | 166 | | | |
| 30 to 34 years... | 204 | 267 | 296 | 310 | 321 | 321 | 105 | 138 | 153 | 158 | 166 | 167 | 98 | 129 | 144 | 151 | 155 | 154 | | | |
| 35 to 39 years... | 163 | 203 | 266 | 295 | 308 | 319 | 85 | 105 | 137 | 152 | 157 | 165 | 78 | 98 | 129 | 143 | 151 | 154 | | | |
| 40 to 44 years... | 144 | 161 | 201 | 263 | 292 | 306 | 76 | 84 | 103 | 136 | 150 | 156 | 68 | 78 | 97 | 126 | 142 | 150 | | | |
| 45 to 49 years... | 133 | 142 | 159 | 199 | 260 | 289 | 70 | 75 | 82 | 102 | 133 | 148 | 62 | 67 | 77 | 97 | 127 | 141 | | | |
| 50 to 54 years... | 107 | 130 | 139 | 156 | 195 | 235 | 57 | 68 | 73 | 80 | 99 | 130 | 51 | 62 | 67 | 76 | 95 | 123 | | | |
| 55 to 59 years... | 91 | 104 | 126 | 135 | 151 | 189 | 47 | 54 | 66 | 70 | 77 | 95 | 44 | 50 | 60 | 65 | 75 | 94 | | | |
| 60 to 64 years... | 67 | 87 | 99 | 120 | 129 | 144 | 32 | 44 | 51 | 61 | 65 | 72 | 35 | 42 | 48 | 58 | 63 | 72 | | | |
| 65 to 69 years... | 37 | 62 | 60 | 91 | 111 | 119 | 27 | 29 | 40 | 46 | 55 | 59 | 30 | 33 | 40 | 45 | 55 | 60 | | | |
| 70 to 74 years... | 45 | 50 | 54 | 70 | 80 | 97 | 21 | 23 | 24 | 34 | 39 | 47 | 24 | 27 | 30 | 36 | 41 | 50 | | | |
| 75 to 79 years... | 32 | 37 | 41 | 45 | 58 | 67 | 14 | 15 | 18 | 19 | 27 | 31 | 18 | 21 | 23 | 26 | 31 | 35 | | | |
| 80 years and over | 39 | 48 | 57 | 66 | 75 | 91 | 15 | 18 | 22 | 26 | 29 | 36 | 24 | 30 | 35 | 41 | 47 | 55 | | | |

TABLE II-C.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--BULGARIA, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | | |
|-------------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | |
| All ages: | | | | | | | | | | | | | | | | | | | | |
| High..... | 8,944 | 9,011 | 9,100 | 9,218 | 9,311 | 9,377 | 4,430 | 4,445 | 4,476 | 4,526 | 4,567 | 4,599 | 4,514 | 4,566 | 4,624 | 4,693 | 4,744 | 4,777 | | |
| Medium..... | | 8,978 | 9,009 | 9,046 | 9,045 | 9,008 | | 4,428 | 4,430 | 4,437 | 4,431 | 4,411 | | 4,411 | 4,431 | 4,550 | 4,579 | 4,608 | 4,614 | 4,598 |
| Low..... | | 8,945 | 9,018 | 9,073 | 9,080 | 8,645 | | 4,412 | 4,383 | 4,348 | 4,295 | 4,224 | | 4,224 | 4,334 | 4,535 | 4,524 | 4,485 | 4,485 | 4,421 |
| Constant..... | | 8,979 | 9,015 | 9,059 | 9,068 | 9,040 | | 4,429 | 4,433 | 4,444 | 4,443 | 4,427 | | 4,427 | 4,550 | 4,582 | 4,615 | 4,625 | 4,613 | 4,613 |
| Under 5 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 603 | 605 | 642 | 676 | 668 | 650 | 309 | 311 | 329 | 347 | 343 | 334 | 294 | 295 | 313 | 329 | 325 | 316 | | |
| Medium..... | | 573 | 584 | 594 | 575 | 547 | | 294 | 300 | 305 | 295 | 281 | | 281 | 279 | 284 | 289 | 280 | 266 | |
| Low..... | | 540 | 526 | 512 | 482 | 449 | | 277 | 270 | 263 | 247 | 231 | | 231 | 263 | 256 | 249 | 234 | 219 | |
| Constant..... | | 574 | 588 | 602 | 584 | 557 | | 294 | 302 | 309 | 300 | 286 | | 286 | 279 | 286 | 293 | 284 | 271 | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 671 | 601 | 603 | 640 | 674 | 667 | 343 | 309 | 328 | 346 | 342 | 342 | 328 | 293 | 294 | 312 | 328 | 325 | | |
| Medium..... | | 570 | 582 | 592 | 573 | 547 | | 292 | 298 | 304 | 294 | 294 | | 294 | 278 | 284 | 288 | 279 | 279 | |
| Low..... | | 538 | 524 | 510 | 481 | 481 | | 276 | 269 | 262 | 247 | 247 | | 247 | 262 | 255 | 248 | 234 | 234 | |
| Constant..... | | 571 | 586 | 600 | 583 | 583 | | 293 | 301 | 308 | 299 | 299 | | 299 | 278 | 286 | 292 | 284 | 284 | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 657 | 669 | 600 | 602 | 639 | 673 | 337 | 308 | 328 | 345 | 345 | 345 | 321 | 293 | 293 | 311 | 328 | 328 | | |
| Medium..... | | 559 | 581 | 591 | 591 | 591 | | 292 | 298 | 303 | 303 | 303 | | 278 | 283 | 288 | 288 | 288 | | |
| Low..... | | 537 | 523 | 509 | 509 | 509 | | 275 | 268 | 261 | 261 | 261 | | 261 | 262 | 255 | 248 | 248 | | |
| Constant..... | | 570 | 585 | 599 | 599 | 599 | | 292 | 300 | 307 | 307 | 307 | | 278 | 285 | 292 | 292 | | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 619 | 655 | 668 | 598 | 600 | 638 | 318 | 307 | 327 | 342 | 342 | 342 | 302 | 320 | 326 | 292 | 293 | 311 | | |
| Medium..... | | 568 | 580 | 580 | 580 | 580 | | 291 | 297 | 297 | 297 | 297 | | 277 | 283 | 283 | | | | |
| Low..... | | 535 | 522 | 522 | 522 | 522 | | 274 | 267 | 267 | 267 | 267 | | 261 | 255 | 255 | | | | |
| Constant..... | | 569 | 584 | 584 | 584 | 584 | | 291 | 299 | 299 | 299 | 299 | | 278 | 285 | 285 | | | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 617 | 617 | 653 | 665 | 596 | 599 | 315 | 316 | 333 | 339 | 304 | 306 | 301 | 301 | 319 | 326 | 292 | 293 | | |
| Medium..... | | 566 | 566 | 566 | 566 | 566 | | 290 | 290 | 290 | 290 | 290 | | 277 | 277 | 277 | | | | |
| Low..... | | 534 | 534 | 534 | 534 | 534 | | 273 | 273 | 273 | 273 | 273 | | 261 | 261 | 261 | | | | |
| Constant..... | | 567 | 567 | 567 | 567 | 567 | | 290 | 290 | 290 | 290 | 290 | | 277 | 277 | 277 | | | | |
| 25 to 29 years... | 627 | 614 | 614 | 650 | 662 | 594 | 319 | 313 | 313 | 331 | 337 | 303 | 308 | 301 | 300 | 319 | 325 | 291 | | |
| 30 to 34 years... | 645 | 623 | 610 | 610 | 646 | 609 | 323 | 316 | 310 | 311 | 329 | 338 | 321 | 307 | 300 | 299 | 318 | 324 | | |
| 35 to 39 years... | 663 | 639 | 618 | 606 | 642 | 606 | 331 | 319 | 312 | 307 | 308 | 326 | 332 | 320 | 305 | 298 | 298 | 317 | | |
| 40 to 44 years... | 553 | 654 | 631 | 610 | 599 | 600 | 275 | 325 | 314 | 307 | 302 | 304 | 278 | 329 | 318 | 303 | 297 | 297 | | |
| 45 to 49 years... | 544 | 542 | 642 | 620 | 600 | 589 | 269 | 267 | 316 | 305 | 300 | 295 | 276 | 275 | 326 | 314 | 300 | 294 | | |
| 50 to 54 years... | 603 | 527 | 526 | 624 | 603 | 585 | 298 | 257 | 256 | 303 | 294 | 289 | 305 | 270 | 270 | 320 | 309 | 296 | | |
| 55 to 59 years... | 581 | 574 | 503 | 503 | 597 | 579 | 283 | 278 | 241 | 240 | 286 | 278 | 297 | 296 | 262 | 262 | 312 | 302 | | |
| 60 to 64 years... | 541 | 538 | 533 | 468 | 470 | 560 | 257 | 253 | 251 | 218 | 218 | 261 | 284 | 283 | 281 | 230 | 251 | 299 | | |
| 65 to 69 years... | 299 | 479 | 476 | 475 | 419 | 422 | 138 | 219 | 217 | 215 | 187 | 189 | 161 | 260 | 259 | 259 | 231 | 233 | | |
| 70 to 74 years... | 320 | 244 | 391 | 391 | 393 | 349 | 145 | 107 | 169 | 169 | 169 | 148 | 175 | 138 | 222 | 222 | 224 | 201 | | |
| 75 to 79 years... | 224 | 228 | 176 | 283 | 285 | 289 | 98 | 97 | 72 | 115 | 115 | 116 | 126 | 131 | 104 | 169 | 170 | 173 | | |
| 80 years and over | 175 | 201 | 216 | 198 | 252 | 280 | 72 | 81 | 85 | 75 | 94 | 103 | 103 | 120 | 131 | 124 | 159 | 177 | | |

TABLE II-D.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--CZECHOSLOVAKIA, 1985-2010
 (Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | | |
|-------------------|------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-----|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | |
| All ages: | | | | | | | | | | | | | | | | | | | | |
| High..... | 15,500 | 15,757 | 16,080 | 16,533 | 16,966 | 17,324 | 7,548 | 7,678 | 7,844 | 8,075 | 8,299 | 8,485 | 7,932 | 8,079 | 8,236 | 8,458 | 8,667 | 8,839 | | |
| Medium..... | | 15,695 | 15,910 | 16,204 | 16,454 | 16,619 | | 7,646 | 7,798 | 7,907 | 8,037 | 8,124 | | 8,207 | 8,049 | 8,153 | 8,297 | 8,417 | 8,495 | |
| Low..... | | 15,533 | 15,741 | 15,875 | 15,944 | 15,922 | | 7,615 | 7,671 | 7,735 | 7,776 | 7,768 | | 7,768 | 8,019 | 8,070 | 8,136 | 8,168 | 8,154 | |
| Constant..... | | 15,704 | 15,959 | 16,328 | 16,670 | 16,924 | | 7,631 | 7,783 | 7,971 | 8,147 | 8,281 | | 8,417 | 8,053 | 8,177 | 8,358 | 8,523 | 8,644 | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,146 | 1,152 | 1,208 | 1,319 | 1,319 | 1,266 | 587 | 589 | 618 | 674 | 675 | 648 | 360 | 363 | 390 | 644 | 645 | 618 | | |
| Medium..... | | 1,090 | 1,099 | 1,159 | 1,136 | 1,072 | | 557 | 562 | 593 | 581 | 548 | | 581 | 533 | 537 | 566 | 555 | 524 | |
| Low..... | | 1,029 | 991 | 1,000 | 954 | 885 | | 526 | 507 | 511 | 488 | 453 | | 488 | 503 | 484 | 488 | 466 | 456 | |
| Constant..... | | 1,099 | 1,139 | 1,235 | 1,228 | 1,162 | | 562 | 582 | 631 | 628 | 595 | | 595 | 537 | 557 | 603 | 600 | 568 | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,336 | 1,144 | 1,150 | 1,206 | 1,317 | 1,318 | 693 | 585 | 588 | 617 | 673 | 674 | 663 | 559 | 562 | 589 | 644 | 644 | | |
| Medium..... | | 1,088 | 1,098 | 1,158 | 1,158 | 1,135 | | 556 | 561 | 592 | 581 | 581 | | 532 | 537 | 566 | 555 | 524 | | |
| Low..... | | 1,027 | 990 | 998 | 953 | 885 | | 525 | 506 | 511 | 488 | 453 | | 488 | 502 | 484 | 488 | 466 | 456 | |
| Constant..... | | 1,098 | 1,137 | 1,233 | 1,227 | 1,162 | | 561 | 582 | 631 | 628 | 595 | | 595 | 537 | 556 | 603 | 599 | | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,278 | 1,354 | 1,143 | 1,149 | 1,205 | 1,316 | 653 | 692 | 585 | 587 | 616 | 673 | 625 | 662 | 559 | 562 | 589 | 643 | | |
| Medium..... | | 1,088 | 1,098 | 1,158 | 1,158 | 1,135 | | 556 | 561 | 592 | 581 | 581 | | 532 | 537 | 566 | 555 | 524 | | |
| Low..... | | 1,027 | 990 | 998 | 953 | 885 | | 525 | 506 | 511 | 488 | 453 | | 488 | 502 | 484 | 488 | 466 | 456 | |
| Constant..... | | 1,097 | 1,137 | 1,233 | 1,227 | 1,162 | | 561 | 582 | 631 | 628 | 595 | | 595 | 537 | 556 | 603 | 599 | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,065 | 1,276 | 1,352 | 1,141 | 1,147 | 1,204 | 544 | 652 | 690 | 585 | 586 | 615 | 521 | 624 | 661 | 558 | 558 | 589 | | |
| Medium..... | | 1,086 | 1,096 | 1,156 | 1,156 | 1,133 | | 556 | 561 | 592 | 581 | 581 | | 532 | 537 | 566 | 555 | 524 | | |
| Low..... | | 1,026 | 989 | 998 | 953 | 885 | | 524 | 506 | 511 | 488 | 453 | | 488 | 502 | 484 | 488 | 466 | 456 | |
| Constant..... | | 1,097 | 1,137 | 1,233 | 1,227 | 1,162 | | 561 | 582 | 631 | 628 | 595 | | 595 | 537 | 556 | 603 | 599 | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,089 | 1,062 | 1,272 | 1,349 | 1,139 | 1,145 | 557 | 542 | 649 | 688 | 581 | 584 | 532 | 520 | 623 | 661 | 557 | 561 | | |
| Medium..... | | 1,084 | 1,084 | 1,154 | 1,154 | 1,131 | | 557 | 542 | 649 | 688 | 581 | | 584 | 532 | 520 | 623 | 661 | 557 | 561 |
| Low..... | | 1,023 | 988 | 998 | 953 | 885 | | 523 | 505 | 511 | 488 | 453 | | 488 | 502 | 484 | 488 | 466 | 456 | |
| Constant..... | | 1,093 | 1,133 | 1,233 | 1,227 | 1,162 | | 561 | 582 | 631 | 628 | 595 | | 595 | 537 | 556 | 603 | 599 | | |
| 25 to 29 years... | 1,140 | 1,085 | 1,058 | 1,268 | 1,345 | 1,136 | 582 | 554 | 539 | 646 | 685 | 579 | 558 | 531 | 519 | 622 | 660 | 597 | | |
| 30 to 34 years... | 1,262 | 1,134 | 1,080 | 1,054 | 1,264 | 1,340 | 639 | 577 | 550 | 536 | 643 | 682 | 625 | 557 | 530 | 518 | 621 | 659 | | |
| 35 to 39 years... | 1,201 | 1,283 | 1,127 | 1,073 | 1,048 | 1,257 | 605 | 633 | 572 | 546 | 532 | 638 | 596 | 620 | 555 | 528 | 516 | 619 | | |
| 40 to 44 years... | 970 | 1,187 | 1,239 | 1,115 | 1,064 | 1,039 | 482 | 595 | 623 | 564 | 538 | 525 | 488 | 592 | 616 | 552 | 525 | 514 | | |
| 45 to 49 years... | 791 | 951 | 1,165 | 1,218 | 1,097 | 1,048 | 387 | 468 | 579 | 607 | 550 | 527 | 404 | 483 | 536 | 610 | 547 | 521 | | |
| 50 to 54 years... | 824 | 764 | 921 | 1,130 | 1,183 | 1,067 | 397 | 368 | 447 | 554 | 582 | 529 | 426 | 396 | 474 | 576 | 601 | 539 | | |
| 55 to 59 years... | 842 | 780 | 727 | 878 | 1,079 | 1,132 | 393 | 367 | 342 | 416 | 518 | 546 | 449 | 413 | 385 | 461 | 561 | 586 | | |
| 60 to 64 years... | 826 | 773 | 719 | 672 | 815 | 1,005 | 369 | 347 | 326 | 305 | 374 | 467 | 427 | 426 | 393 | 367 | 441 | 538 | | |
| 65 to 69 years... | 432 | 724 | 681 | 636 | 599 | 729 | 187 | 307 | 290 | 274 | 259 | 319 | 246 | 418 | 391 | 362 | 340 | 409 | | |
| 70 to 74 years... | 558 | 354 | 596 | 564 | 530 | 503 | 228 | 142 | 235 | 224 | 213 | 204 | 330 | 212 | 362 | 340 | 316 | 299 | | |
| 75 to 79 years... | 408 | 400 | 260 | 438 | 418 | 395 | 151 | 148 | 95 | 157 | 152 | 146 | 257 | 253 | 165 | 282 | 267 | 230 | | |
| 80 years and over | 312 | 363 | 383 | 322 | 397 | 423 | 94 | 112 | 118 | 96 | 120 | 129 | 218 | 251 | 265 | 226 | 276 | 294 | | |

TABLE II-E.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--GERMAN DEMOCRATIC REPUBLIC, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | | | | | | | | | |
|--------------------------|------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | | | | | | | | |
| All ages: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 16,649 | 16,642 | 16,709 | 16,840 | 17,027 | 17,208 | 7,871 | 7,949 | 8,063 | 8,189 | 8,327 | 8,444 | 8,778 | 8,693 | 8,646 | 8,650 | 8,700 | 8,764 | | | | | | | | | |
| Medium..... | | 16,578 | 16,542 | 16,539 | 16,565 | 16,559 | | 7,916 | 7,977 | 8,035 | 8,090 | 8,111 | | 8,667 | 8,565 | 8,504 | 8,475 | 8,448 | | | | | | | | | |
| Low..... | | 16,514 | 16,375 | 16,238 | 16,104 | 15,918 | | 7,883 | 7,891 | 7,880 | 7,853 | 7,782 | | 8,631 | 8,483 | 8,358 | 8,251 | 8,136 | | | | | | | | | |
| Constant..... | | 16,566 | 16,487 | 16,415 | 16,353 | 16,254 | | 7,910 | 7,949 | 7,971 | 7,981 | 7,954 | | 8,656 | 8,538 | 8,444 | 8,372 | 8,300 | | | | | | | | | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,157 | 1,167 | 1,111 | 1,092 | 1,167 | 1,203 | 592 | 599 | 571 | 561 | 600 | 618 | 564 | 568 | 541 | 531 | 568 | 585 | | | | | | | | | |
| Medium..... | | 1,103 | 1,008 | 958 | 1,006 | 1,015 | | 566 | 518 | 492 | 517 | 521 | | 537 | 491 | 466 | 489 | 494 | | | | | | | | | |
| Low..... | | 1,039 | 905 | 823 | 846 | 834 | | 533 | 465 | 423 | 435 | 429 | | 505 | 440 | 401 | 411 | 406 | | | | | | | | | |
| Constant..... | | 1,091 | 966 | 888 | 918 | 922 | | 560 | 496 | 456 | 472 | 474 | | 531 | 470 | 432 | 447 | 448 | | | | | | | | | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,072 | 1,151 | 1,164 | 1,109 | 1,090 | 1,166 | 549 | 589 | 597 | 570 | 560 | 599 | 523 | 562 | 567 | 540 | 530 | 567 | | | | | | | | | |
| Medium..... | | | 1,100 | 1,007 | 956 | 1,005 | | | 564 | 517 | 491 | 516 | | | 516 | 535 | 490 | 465 | 489 | | | | | | | | |
| Low..... | | | 1,036 | 904 | 822 | 845 | | | 531 | 464 | 422 | 434 | | | 434 | 504 | 440 | 400 | 411 | | | | | | | | |
| Constant..... | | | 1,088 | 964 | 886 | 917 | | | 558 | 495 | 455 | 471 | | | 471 | 530 | 469 | 431 | 446 | | | | | | | | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 976 | 1,067 | 1,149 | 1,163 | 1,108 | 1,089 | 500 | 546 | 596 | 569 | 559 | 477 | 522 | 561 | 566 | 540 | 530 | 567 | | | | | | | | | |
| Medium..... | | | | 1,099 | 1,006 | 955 | | | 1,005 | 563 | 516 | | | | 490 | 515 | 535 | 490 | 465 | 489 | | | | | | | |
| Low..... | | | | 1,035 | 903 | 822 | | | 845 | 531 | 463 | | | | 422 | 434 | 434 | 504 | 440 | 400 | 411 | | | | | | |
| Constant..... | | | | 1,087 | 963 | 885 | | | 917 | 557 | 494 | | | | 455 | 471 | 471 | 529 | 469 | 431 | 446 | | | | | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,226 | 970 | 1,063 | 1,146 | 1,160 | 1,106 | 628 | 495 | 543 | 585 | 595 | 567 | 598 | 475 | 520 | 561 | 566 | 539 | | | | | | | | | |
| Medium..... | | | | | 1,096 | 1,004 | | | | | 955 | 1,004 | | | | | 562 | 515 | 490 | 515 | 535 | 490 | 465 | 489 | | | |
| Low..... | | | | | 1,033 | 901 | | | | | 822 | 845 | | | | | 529 | 462 | 422 | 434 | 434 | 504 | 440 | 400 | 411 | | |
| Constant..... | | | | | 1,085 | 962 | | | | | 885 | 917 | | | | | 556 | 493 | 455 | 471 | 471 | 529 | 469 | 431 | 446 | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,420 | 1,216 | 965 | 1,060 | 1,143 | 1,157 | 727 | 621 | 492 | 540 | 592 | 693 | 595 | 473 | 520 | 560 | 565 | 534 | | | | | | | | | |
| Medium..... | | | | | | 1,093 | | | | | 1,004 | | | | | | 955 | 1,004 | 562 | 515 | 490 | 515 | 535 | 490 | 465 | 489 | |
| Low..... | | | | | | 1,030 | | | | | 901 | | | | | | 822 | 845 | 529 | 462 | 422 | 434 | 434 | 504 | 440 | 400 | 411 |
| Constant..... | | | | | | 1,082 | | | | | 962 | | | | | | 885 | 917 | 556 | 493 | 455 | 471 | 471 | 529 | 469 | 431 | 446 |
| 25 to 29 years... | 1,295 | 1,407 | 1,209 | 961 | 1,056 | 1,139 | 662 | 718 | 616 | 489 | 537 | 590 | 633 | 650 | 593 | 472 | 519 | 559 | | | | | | | | | |
| 30 to 34 years... | 1,272 | 1,282 | 1,398 | 1,204 | 967 | 1,052 | 648 | 653 | 711 | 612 | 486 | 534 | 624 | 629 | 687 | 592 | 471 | 518 | | | | | | | | | |
| 35 to 39 years... | 888 | 1,257 | 1,272 | 1,390 | 1,197 | 952 | 448 | 637 | 646 | 705 | 607 | 482 | 440 | 619 | 628 | 694 | 590 | 470 | | | | | | | | | |
| 40 to 44 years... | 1,130 | 873 | 1,242 | 1,260 | 1,378 | 1,187 | 363 | 438 | 628 | 638 | 698 | 601 | 567 | 435 | 615 | 622 | 681 | 587 | | | | | | | | | |
| 45 to 49 years... | 1,265 | 1,106 | 858 | 1,224 | 1,242 | 1,360 | 629 | 547 | 428 | 615 | 626 | 685 | 635 | 559 | 430 | 609 | 616 | 575 | | | | | | | | | |
| 50 to 54 years... | 939 | 1,227 | 1,076 | 857 | 1,194 | 1,214 | 493 | 605 | 527 | 414 | 595 | 607 | 506 | 622 | 548 | 423 | 599 | 607 | | | | | | | | | |
| 55 to 59 years... | 904 | 854 | 1,176 | 1,032 | 806 | 1,131 | 402 | 464 | 571 | 499 | 393 | 566 | 502 | 490 | 605 | 534 | 413 | 585 | | | | | | | | | |
| 60 to 64 years... | 792 | 841 | 892 | 1,104 | 970 | 874 | 291 | 367 | 425 | 525 | 458 | 363 | 502 | 474 | 467 | 579 | 512 | 398 | | | | | | | | | |
| 65 to 69 years... | 486 | 699 | 751 | 801 | 998 | 874 | 169 | 245 | 316 | 368 | 456 | 398 | 316 | 454 | 436 | 433 | 539 | 476 | | | | | | | | | |
| 70 to 74 years... | 682 | 395 | 581 | 629 | 671 | 836 | 126 | 189 | 249 | 291 | 363 | 454 | 269 | 392 | 380 | 380 | 474 | | | | | | | | | | |
| 75 to 79 years... | 580 | 493 | 293 | 432 | 468 | 500 | 190 | 148 | 85 | 128 | 171 | 200 | 389 | 345 | 209 | 304 | 298 | 300 | | | | | | | | | |
| 80 years and over | 505 | 535 | 508 | 396 | 423 | 460 | 151 | 151 | 131 | 96 | 103 | 130 | 354 | 385 | 376 | 301 | 320 | 330 | | | | | | | | | |

TABLE II-F.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--HUNGARY, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | |
|-------------------|------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
| All ages: | | | | | | | | | | | | | | | | | | |
| High..... | 10,649 | 10,582 | 10,577 | 10,677 | 10,776 | 10,831 | 5,143 | 5,098 | 5,092 | 5,142 | 5,198 | 5,234 | 5,505 | 5,484 | 5,485 | 5,535 | 5,578 | 5,597 |
| Medium..... | | 10,546 | 10,474 | 10,477 | 10,466 | 10,408 | | 5,080 | 5,039 | 5,040 | 5,040 | 5,018 | | 5,466 | 5,435 | 5,437 | 5,427 | 5,390 |
| Low..... | | 10,509 | 10,372 | 10,278 | 10,158 | 9,989 | | 5,061 | 4,938 | 4,938 | 4,882 | 4,804 | | 5,448 | 5,385 | 5,340 | 5,276 | 5,183 |
| Constant..... | | 10,543 | 10,462 | 10,446 | 10,413 | 10,333 | | 5,078 | 5,033 | 5,024 | 5,012 | 4,980 | | 5,465 | 5,429 | 5,422 | 5,401 | 5,353 |
| Under 3 years: | | | | | | | | | | | | | | | | | | |
| High..... | 654 | 665 | 720 | 797 | 792 | 744 | 334 | 340 | 368 | 407 | 405 | 381 | 320 | 325 | 352 | 389 | 387 | 363 |
| Medium..... | | 628 | 653 | 699 | 682 | 630 | | 321 | 334 | 358 | 349 | 322 | | 307 | 319 | 342 | 333 | 308 |
| Low..... | | 592 | 587 | 602 | 573 | 519 | | 303 | 300 | 308 | 293 | 266 | | 290 | 287 | 294 | 280 | 254 |
| Constant..... | | 626 | 643 | 681 | 660 | 608 | | 320 | 329 | 348 | 337 | 311 | | 306 | 315 | 333 | 322 | 297 |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | |
| High..... | 842 | 653 | 663 | 718 | 796 | 791 | 433 | 333 | 339 | 367 | 407 | 405 | 410 | 320 | 325 | 351 | 389 | 387 |
| Medium..... | | 627 | 652 | 698 | 681 | 681 | | 320 | 333 | 357 | 348 | 348 | | 307 | 319 | 341 | 333 | |
| Low..... | | 591 | 586 | 601 | 572 | 519 | | 302 | 300 | 307 | 292 | 292 | | 289 | 287 | 294 | 279 | |
| Constant..... | | 625 | 642 | 680 | 659 | 659 | | 319 | 328 | 347 | 337 | 337 | | 306 | 314 | 332 | 322 | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | |
| High..... | 792 | 841 | 652 | 663 | 718 | 795 | 407 | 432 | 333 | 338 | 367 | 406 | 384 | 409 | 319 | 324 | 351 | 389 |
| Medium..... | | 627 | 652 | 698 | 681 | 681 | | 320 | 333 | 357 | 348 | 348 | | 307 | 319 | 341 | 333 | |
| Low..... | | 590 | 586 | 601 | 572 | 519 | | 302 | 300 | 307 | 292 | 292 | | 289 | 287 | 294 | 279 | |
| Constant..... | | 624 | 642 | 679 | 659 | 659 | | 319 | 328 | 347 | 337 | 337 | | 306 | 314 | 332 | 322 | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | |
| High..... | 710 | 790 | 839 | 651 | 662 | 717 | 366 | 406 | 431 | 332 | 338 | 366 | 344 | 384 | 409 | 319 | 324 | 351 |
| Medium..... | | 626 | 651 | 685 | 651 | 651 | | 319 | 332 | 357 | 348 | 348 | | 307 | 319 | 341 | 333 | |
| Low..... | | 589 | 585 | 601 | 572 | 519 | | 301 | 299 | 307 | 292 | 292 | | 289 | 287 | 294 | 279 | |
| Constant..... | | 623 | 641 | 679 | 659 | 659 | | 318 | 327 | 347 | 337 | 337 | | 305 | 314 | 332 | 322 | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | |
| High..... | 643 | 707 | 787 | 837 | 649 | 660 | 330 | 364 | 404 | 429 | 331 | 336 | 312 | 343 | 383 | 408 | 318 | 324 |
| Medium..... | | 624 | 652 | 698 | 681 | 681 | | 320 | 333 | 357 | 348 | 348 | | 307 | 319 | 341 | 333 | |
| Low..... | | 590 | 586 | 601 | 572 | 519 | | 302 | 299 | 307 | 292 | 292 | | 289 | 287 | 294 | 279 | |
| Constant..... | | 622 | 642 | 679 | 659 | 659 | | 319 | 328 | 347 | 337 | 337 | | 306 | 314 | 332 | 322 | |
| 25 to 29 years... | 782 | 639 | 703 | 783 | 833 | 647 | 398 | 327 | 361 | 401 | 426 | 329 | 384 | 312 | 342 | 382 | 407 | 318 |
| 30 to 34 years... | 895 | 776 | 634 | 698 | 779 | 829 | 452 | 393 | 324 | 357 | 398 | 423 | 442 | 382 | 310 | 341 | 381 | 406 |
| 35 to 39 years... | 764 | 883 | 766 | 627 | 692 | 773 | 384 | 444 | 387 | 319 | 353 | 393 | 380 | 439 | 380 | 308 | 339 | 379 |
| 40 to 44 years... | 703 | 749 | 867 | 754 | 618 | 683 | 347 | 373 | 433 | 377 | 313 | 346 | 355 | 376 | 434 | 376 | 306 | 337 |
| 45 to 49 years... | 637 | 682 | 728 | 844 | 735 | 605 | 303 | 332 | 358 | 417 | 364 | 303 | 334 | 349 | 370 | 428 | 371 | 302 |
| 50 to 54 years... | 648 | 609 | 632 | 699 | 814 | 710 | 307 | 283 | 312 | 338 | 395 | 346 | 341 | 326 | 341 | 361 | 319 | 364 |
| 55 to 59 years... | 648 | 605 | 571 | 614 | 660 | 771 | 300 | 278 | 258 | 285 | 311 | 365 | 348 | 327 | 313 | 328 | 349 | 406 |
| 60 to 64 years... | 615 | 587 | 550 | 322 | 563 | 609 | 272 | 260 | 242 | 226 | 252 | 277 | 343 | 327 | 308 | 296 | 311 | 332 |
| 65 to 69 years... | 350 | 534 | 512 | 483 | 462 | 500 | 148 | 223 | 215 | 201 | 190 | 213 | 202 | 311 | 297 | 282 | 272 | 287 |
| 70 to 74 years... | 427 | 285 | 435 | 420 | 399 | 385 | 172 | 112 | 168 | 164 | 155 | 148 | 254 | 173 | 266 | 256 | 244 | 237 |
| 75 to 79 years... | 300 | 304 | 207 | 316 | 308 | 295 | 112 | 111 | 74 | 111 | 109 | 104 | 188 | 193 | 134 | 205 | 199 | 191 |
| 80 years and over | 240 | 273 | 290 | 282 | 297 | 317 | 78 | 85 | 88 | 73 | 86 | 92 | 162 | 187 | 203 | 179 | 211 | 225 |

TABLE II-G.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--POLAND, 1985-2010
 (Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | | Males | | | | | | Females | | | | | |
|-------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
| All ages: | | | | | | | | | | | | | | | | | | |
| High..... | 37,202 | 38,534 | 39,623 | 40,729 | 41,911 | 43,142 | 18,142 | 18,805 | 19,350 | 19,903 | 20,501 | 21,132 | 19,060 | 19,730 | 20,273 | 20,826 | 21,410 | 22,010 |
| Medium..... | | 38,363 | 39,187 | 39,926 | 40,663 | 41,392 | | 18,717 | 19,126 | 19,491 | 19,860 | 20,234 | | 19,646 | 20,061 | 20,433 | 20,803 | 21,159 |
| Low..... | | 38,192 | 38,750 | 39,123 | 39,416 | 39,658 | | 18,629 | 18,902 | 19,079 | 19,220 | 19,344 | | 19,563 | 19,849 | 20,044 | 20,196 | 20,314 |
| Constant..... | | 38,429 | 39,515 | 40,739 | 42,107 | 43,509 | | 18,781 | 19,294 | 19,909 | 20,602 | 21,321 | | 19,679 | 20,221 | 20,831 | 21,505 | 22,188 |
| Under 5 years: | | | | | | | | | | | | | | | | | | |
| High..... | 3,410 | 3,287 | 3,065 | 3,078 | 3,240 | 3,390 | 1,748 | 1,687 | 1,573 | 1,580 | 1,664 | 1,741 | 1,662 | 1,600 | 1,491 | 1,497 | 1,576 | 1,648 |
| Medium..... | | 3,116 | 2,799 | 2,710 | 2,793 | 2,886 | | 1,599 | 1,437 | 1,392 | 1,435 | 1,483 | | 1,517 | 1,362 | 1,319 | 1,358 | 1,403 |
| Low..... | | 2,944 | 2,534 | 2,343 | 2,348 | 2,395 | | 1,511 | 1,301 | 1,203 | 1,206 | 1,231 | | 1,433 | 1,233 | 1,140 | 1,142 | 1,165 |
| Constant..... | | 3,182 | 3,062 | 3,196 | 3,426 | 3,560 | | 1,633 | 1,572 | 1,641 | 1,760 | 1,829 | | 1,549 | 1,490 | 1,555 | 1,666 | 1,731 |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | |
| High..... | 3,224 | 3,393 | 3,275 | 3,057 | 3,071 | 3,234 | 1,649 | 1,739 | 1,680 | 1,569 | 1,577 | 1,661 | 1,575 | 1,654 | 1,595 | 1,488 | 1,495 | 1,573 |
| Medium..... | | 3,104 | 2,792 | 2,705 | 2,788 | 2,886 | | 1,592 | 1,433 | 1,388 | 1,432 | 1,512 | | 1,359 | 1,316 | 1,356 | | |
| Low..... | | 2,934 | 2,528 | 2,338 | 2,343 | 2,395 | | 1,505 | 1,297 | 1,200 | 1,203 | 1,429 | | 1,231 | 1,138 | 1,140 | | |
| Constant..... | | 3,170 | 3,054 | 3,189 | 3,420 | 3,560 | | 1,626 | 1,567 | 1,637 | 1,756 | | 1,544 | 1,487 | 1,532 | 1,663 | | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | |
| High..... | 2,852 | 3,215 | 3,386 | 3,270 | 3,053 | 3,068 | 1,458 | 1,643 | 1,677 | 1,566 | 1,574 | 1,661 | 1,394 | 1,571 | 1,593 | 1,487 | 1,487 | 1,493 |
| Medium..... | | 3,100 | 2,788 | 2,701 | 2,793 | 2,886 | | 1,589 | 1,431 | 1,386 | 1,432 | 1,510 | | 1,358 | 1,313 | 1,356 | | |
| Low..... | | 2,929 | 2,524 | 2,333 | 2,343 | 2,395 | | 1,502 | 1,295 | 1,199 | 1,203 | 1,427 | | 1,229 | 1,137 | 1,140 | | |
| Constant..... | | 3,165 | 3,050 | 3,185 | 3,420 | 3,560 | | 1,623 | 1,565 | 1,635 | 1,756 | | 1,542 | 1,485 | 1,551 | 1,663 | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | |
| High..... | 2,509 | 2,841 | 3,205 | 3,263 | 3,047 | 3,047 | 1,282 | 1,451 | 1,637 | 1,528 | 1,528 | 1,617 | 1,227 | 1,390 | 1,568 | 1,464 | 1,464 | 1,485 |
| Medium..... | | 3,093 | 2,783 | 2,701 | 2,793 | 2,886 | | 1,585 | 1,427 | 1,386 | 1,432 | 1,510 | | 1,358 | 1,313 | 1,356 | | |
| Low..... | | 2,923 | 2,519 | 2,333 | 2,343 | 2,395 | | 1,502 | 1,295 | 1,199 | 1,203 | 1,427 | | 1,229 | 1,137 | 1,140 | | |
| Constant..... | | 3,159 | 3,044 | 3,185 | 3,420 | 3,560 | | 1,619 | 1,561 | 1,637 | 1,756 | | 1,540 | 1,485 | 1,551 | 1,663 | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | |
| High..... | 2,748 | 2,488 | 2,826 | 3,192 | 3,366 | 3,253 | 1,410 | 1,269 | 1,441 | 1,627 | 1,719 | 1,664 | 1,339 | 1,219 | 1,385 | 1,565 | 1,646 | 1,589 |
| Medium..... | | 3,083 | 2,774 | 2,701 | 2,793 | 2,886 | | 1,585 | 1,427 | 1,386 | 1,432 | 1,510 | | 1,358 | 1,313 | 1,356 | | |
| Low..... | | 2,913 | 2,507 | 2,333 | 2,343 | 2,395 | | 1,502 | 1,295 | 1,199 | 1,203 | 1,427 | | 1,229 | 1,137 | 1,140 | | |
| Constant..... | | 3,149 | 3,034 | 3,169 | 3,404 | 3,539 | | 1,611 | 1,553 | 1,623 | 1,742 | | 1,538 | 1,481 | 1,548 | 1,663 | | |
| 25 to 29 years.. | 3,305 | 2,719 | 2,469 | 2,811 | 3,177 | 3,351 | 1,687 | 1,390 | 1,256 | 1,429 | 1,615 | 1,708 | 1,617 | 1,329 | 1,214 | 1,382 | 1,562 | 1,643 |
| 30 to 34 years.. | 3,311 | 3,269 | 2,695 | 2,453 | 2,794 | 3,160 | 1,674 | 1,662 | 1,372 | 1,243 | 1,416 | 1,602 | 1,637 | 1,607 | 1,323 | 1,210 | 1,378 | 1,558 |
| 35 to 39 years.. | 2,732 | 3,270 | 3,233 | 2,670 | 2,432 | 2,774 | 1,372 | 1,645 | 1,636 | 1,354 | 1,528 | 1,401 | 1,360 | 1,626 | 1,598 | 1,316 | 1,204 | 1,372 |
| 40 to 44 years.. | 1,820 | 2,685 | 3,218 | 3,187 | 2,635 | 2,404 | 900 | 1,338 | 1,607 | 1,602 | 1,328 | 1,208 | 920 | 1,347 | 1,611 | 1,585 | 1,307 | 1,196 |
| 45 to 49 years.. | 2,047 | 1,772 | 2,620 | 3,146 | 3,121 | 2,585 | 1,000 | 866 | 820 | 760 | 1,555 | 1,385 | 1,292 | 1,047 | 906 | 1,329 | 1,091 | 1,067 |
| 50 to 54 years.. | 2,091 | 1,968 | 1,707 | 2,531 | 3,045 | 3,027 | 1,012 | 945 | 820 | 760 | 1,228 | 1,484 | 1,468 | 1,079 | 1,023 | 887 | 1,303 | 1,561 |
| 55 to 59 years.. | 1,991 | 1,972 | 1,860 | 1,619 | 2,409 | 2,904 | 920 | 930 | 871 | 760 | 1,144 | 1,386 | 1,072 | 1,042 | 969 | 899 | 1,265 | 1,518 |
| 60 to 64 years.. | 1,648 | 1,831 | 1,816 | 1,720 | 1,502 | 2,245 | 711 | 816 | 828 | 779 | 683 | 1,035 | 935 | 815 | 815 | 819 | 1,210 | 1,518 |
| 65 to 69 years.. | 976 | 1,457 | 1,621 | 1,613 | 1,535 | 1,346 | 406 | 598 | 688 | 702 | 665 | 586 | 570 | 859 | 933 | 911 | 871 | 760 |
| 70 to 74 years.. | 1,076 | 807 | 1,211 | 1,353 | 1,350 | 1,293 | 420 | 313 | 464 | 538 | 551 | 526 | 655 | 494 | 747 | 815 | 799 | 756 |
| 75 to 79 years.. | 813 | 792 | 602 | 910 | 1,020 | 1,021 | 298 | 281 | 213 | 317 | 372 | 363 | 515 | 311 | 389 | 593 | 648 | 638 |
| 80 years and over | 649 | 767 | 813 | 742 | 696 | 1,041 | 195 | 232 | 240 | 214 | 261 | 314 | 454 | 335 | 573 | 528 | 635 | 727 |

TABLE II-H.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--ROMANIA, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | Males | | | | | Females | | | | | | | | |
|---------------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|-----|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | |
| All ages: | | | | | | | | | | | | | | | | | | | |
| High..... | 22,727 | 23,369 | 24,128 | 24,893 | 25,530 | 26,067 | 11,216 | 11,537 | 11,920 | 12,302 | 12,621 | 12,891 | 11,511 | 11,831 | 12,208 | 12,591 | 12,909 | 13,175 | |
| Medium..... | | 23,269 | 23,855 | 24,381 | 24,748 | 24,992 | | 11,486 | 11,780 | 12,040 | 12,221 | 12,341 | | 11,783 | 12,075 | 12,341 | 12,528 | 12,651 | |
| Low..... | | 23,170 | 23,582 | 23,869 | 23,968 | 23,930 | | 11,435 | 11,640 | 11,777 | 11,821 | 11,797 | | 11,734 | 11,942 | 12,091 | 12,148 | 12,133 | |
| Constant..... | | 23,307 | 24,055 | 24,877 | 25,600 | 26,294 | | 11,506 | 11,883 | 12,294 | 12,657 | 12,962 | | 11,801 | 12,172 | 12,583 | 12,943 | 13,243 | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,714 | 1,874 | 2,007 | 2,009 | 1,951 | 1,920 | 878 | 962 | 1,029 | 1,030 | 1,001 | 984 | 836 | 913 | 977 | 979 | 951 | 935 | |
| Medium..... | | 1,775 | 1,832 | 1,769 | 1,680 | 1,625 | | 911 | 940 | 907 | 862 | 833 | | 864 | 892 | 862 | 819 | 792 | |
| Low..... | | 1,675 | 1,658 | 1,530 | 1,411 | 1,341 | | 859 | 850 | 784 | 723 | 698 | | 816 | 807 | 745 | 687 | 635 | |
| Constant..... | | 1,813 | 1,995 | 2,066 | 2,037 | 1,988 | | 930 | 1,023 | 1,060 | 1,045 | 1,019 | | 883 | 972 | 1,007 | 993 | 969 | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,985 | 1,698 | 1,862 | 1,998 | 2,002 | 1,945 | 1,015 | 869 | 955 | 1,024 | 1,026 | 997 | 970 | 829 | 908 | 974 | 976 | 949 | |
| Medium..... | | | 1,764 | 1,824 | 1,763 | 1,673 | | | 904 | 935 | 903 | 858 | | | 860 | 890 | 860 | 817 | |
| Low..... | | | 1,665 | 1,651 | 1,524 | 1,407 | | | 853 | 846 | 781 | 721 | | | 812 | 805 | 743 | 686 | |
| Constant..... | | | 1,801 | 1,986 | 2,059 | 2,031 | | | 923 | 1,018 | 1,055 | 1,041 | | | 878 | 968 | 1,004 | 991 | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,897 | 1,976 | 1,692 | 1,858 | 1,994 | 1,999 | 970 | 1,010 | 865 | 952 | 1,021 | 1,023 | 927 | 966 | 827 | 907 | 973 | 975 | |
| Medium..... | | | | 1,760 | 1,821 | 1,760 | | | | 901 | 932 | 901 | | | | 858 | 888 | 859 | |
| Low..... | | | | 1,661 | 1,647 | 1,522 | | | | 851 | 843 | 775 | | | | 810 | 804 | 743 | |
| Constant..... | | | | 1,797 | 1,982 | 2,055 | | | | 920 | 1,015 | 1,052 | | | | 877 | 967 | 1,003 | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,994 | 1,888 | 1,970 | 1,688 | 1,854 | 1,990 | 1,017 | 965 | 1,006 | 862 | 949 | 1,018 | 977 | 923 | 964 | 826 | 905 | 972 | |
| Medium..... | | | | | 1,756 | 1,817 | | | | | 898 | 930 | | | | | 857 | 888 | |
| Low..... | | | | | 1,657 | 1,644 | | | | | 848 | 841 | | | | | 809 | 803 | |
| Constant..... | | | | | 1,793 | 1,978 | | | | | 917 | 1,012 | | | | | 876 | 966 | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,411 | 1,977 | 1,878 | 1,963 | 1,683 | 1,849 | 723 | 1,008 | 959 | 1,001 | 858 | 945 | 689 | 969 | 919 | 962 | 824 | 904 | |
| Medium..... | | | | | | 1,751 | | | | | | 895 | | | | | | 930 | 856 |
| Low..... | | | | | | 1,652 | | | | | | 844 | | | | | | 844 | 808 |
| Constant..... | | | | | | 1,788 | | | | | | 914 | | | | | | 874 | 874 |
| 25 to 29 years: | 1,735 | 1,390 | 1,963 | 1,869 | 1,954 | 1,676 | 882 | 711 | 999 | 953 | 995 | 854 | 853 | 679 | 963 | 916 | 959 | 823 | |
| 30 to 34 years: | 1,751 | 1,715 | 1,378 | 1,531 | 1,889 | 1,945 | 898 | 869 | 703 | 991 | 945 | 988 | 866 | 846 | 678 | 960 | 913 | 937 | |
| 35 to 39 years: | 1,467 | 1,730 | 1,697 | 1,367 | 1,937 | 1,846 | 738 | 871 | 857 | 695 | 981 | 937 | 729 | 859 | 840 | 671 | 856 | 910 | |
| 40 to 44 years: | 1,235 | 1,443 | 1,706 | 1,676 | 1,351 | 1,917 | 613 | 722 | 864 | 842 | 684 | 967 | 622 | 721 | 851 | 834 | 667 | 930 | |
| 45 to 49 years: | 1,504 | 1,206 | 1,413 | 1,673 | 1,646 | 1,328 | 741 | 594 | 701 | 831 | 821 | 668 | 763 | 612 | 712 | 841 | 825 | 660 | |
| 50 to 54 years: | 1,437 | 1,453 | 1,169 | 1,372 | 1,626 | 1,602 | 708 | 707 | 568 | 673 | 799 | 791 | 729 | 747 | 600 | 699 | 827 | 812 | |
| 55 to 59 years: | 1,328 | 1,366 | 1,385 | 1,116 | 1,314 | 1,561 | 642 | 661 | 662 | 533 | 634 | 755 | 685 | 705 | 723 | 582 | 680 | 806 | |
| 60 to 64 years: | 1,109 | 1,232 | 1,271 | 1,293 | 1,045 | 1,236 | 503 | 582 | 601 | 603 | 488 | 583 | 606 | 650 | 670 | 690 | 557 | 653 | |
| 65 to 69 years: | 588 | 985 | 1,096 | 1,135 | 1,161 | 942 | 248 | 432 | 501 | 519 | 523 | 425 | 340 | 353 | 595 | 616 | 637 | 517 | |
| 70 to 74 years: | 733 | 487 | 818 | 914 | 951 | 978 | 309 | 196 | 343 | 400 | 416 | 422 | 424 | 291 | 475 | 514 | 535 | 557 | |
| 75 to 79 years: | 493 | 534 | 360 | 608 | 682 | 713 | 206 | 214 | 137 | 243 | 284 | 297 | 286 | 320 | 223 | 366 | 399 | 418 | |
| 80 years and over: | 345 | 412 | 466 | 405 | 520 | 616 | 137 | 164 | 180 | 150 | 195 | 238 | 207 | 248 | 286 | 233 | 324 | 378 | |

TABLE II-1.--ESTIMATED AND PROJECTED POPULATION, BY 5-YEAR AGE GROUPS AND SEX--YUGOSLAVIA, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Age and series | Both sexes | | | | | Males | | | | | Females | | | | | | | | | | | | |
|--------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|-----|-----|-----|-----|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | | | | |
| All ages: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 23,122 | 23,965 | 24,767 | 25,539 | 26,208 | 26,761 | 11,430 | 11,852 | 12,258 | 12,647 | 12,987 | 13,272 | 11,692 | 12,113 | 12,509 | 12,893 | 13,221 | 13,489 | | | | | |
| Medium..... | | 23,864 | 24,498 | 25,040 | 25,443 | 25,707 | | 11,801 | 12,119 | 12,389 | 12,593 | 12,729 | | 12,850 | 12,650 | 12,850 | 12,978 | | | | | | |
| Low..... | | 23,764 | 24,229 | 24,540 | 24,679 | 24,663 | | 11,749 | 11,980 | 12,132 | 12,199 | 12,192 | | 12,192 | 12,015 | 12,248 | 12,408 | 12,480 | 12,471 | | | | |
| Constant..... | | 23,890 | 24,576 | 25,228 | 25,766 | 26,168 | | 11,809 | 12,159 | 12,486 | 12,759 | 12,967 | | 12,967 | 12,071 | 12,416 | 12,742 | 13,007 | 13,202 | | | | |
| Under 5 years: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,822 | 1,876 | 1,890 | 1,912 | 1,922 | 1,926 | 939 | 966 | 974 | 985 | 990 | 992 | 883 | 909 | 916 | 927 | 932 | 934 | | | | | |
| Medium..... | | 1,775 | 1,721 | 1,681 | 1,656 | 1,636 | | 914 | 887 | 866 | 853 | 843 | | 835 | 815 | 803 | 793 | | | | | | |
| Low..... | | 1,674 | 1,553 | 1,450 | 1,391 | 1,334 | | 863 | 800 | 747 | 717 | 698 | | 698 | 812 | 753 | 703 | 674 | 657 | | | | |
| Constant..... | | 1,790 | 1,784 | 1,792 | 1,791 | 1,774 | | 922 | 919 | 923 | 923 | 914 | | 914 | 868 | 865 | 869 | 868 | 860 | | | | |
| 5 to 9 years: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,879 | 1,816 | 1,870 | 1,886 | 1,908 | 1,919 | 965 | 936 | 963 | 971 | 982 | 988 | 914 | 880 | 907 | 915 | 925 | 931 | | | | | |
| Medium..... | | | 1,770 | 1,717 | 1,677 | 1,653 | | | 911 | 884 | 864 | 851 | | | 851 | 833 | 814 | 802 | | | | | |
| Low..... | | | 1,670 | 1,549 | 1,447 | 1,389 | | | 860 | 797 | 745 | 715 | | | 715 | 715 | 702 | 674 | | | | | |
| Constant..... | | | 1,785 | 1,779 | 1,788 | 1,788 | | | 919 | 916 | 921 | 921 | | | 921 | 921 | 866 | 863 | 867 | 867 | | | |
| 10 to 14 years: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,826 | 1,876 | 1,814 | 1,868 | 1,883 | 1,906 | 938 | 963 | 934 | 961 | 969 | 981 | 888 | 913 | 879 | 906 | 914 | 925 | | | | | |
| Medium..... | | | | 1,768 | 1,715 | 1,675 | | | | 910 | 883 | 862 | | | | 862 | 858 | 832 | 813 | | | | |
| Low..... | | | | 1,667 | 1,547 | 1,445 | | | | 858 | 796 | 744 | | | | 744 | 809 | 701 | 701 | | | | |
| Constant..... | | | | 1,783 | 1,777 | 1,786 | | | | 918 | 915 | 919 | | | | 919 | 865 | 862 | 867 | | | | |
| 15 to 19 years: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,812 | 1,822 | 1,873 | 1,810 | 1,865 | 1,881 | 930 | 936 | 960 | 932 | 959 | 967 | 882 | 886 | 912 | 879 | 906 | 913 | | | | | |
| Medium..... | | | | | 1,765 | 1,713 | | | | | 910 | 883 | | | | | 862 | 862 | 858 | 832 | 813 | | |
| Low..... | | | | | 1,665 | 1,545 | | | | | 858 | 796 | | | | | 744 | 744 | 809 | 701 | 701 | | |
| Constant..... | | | | | 1,780 | 1,775 | | | | | 918 | 915 | | | | | 919 | 919 | 865 | 862 | 867 | | |
| 20 to 24 years: | | | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,853 | 1,806 | 1,816 | 1,867 | 1,806 | 1,860 | 946 | 926 | 931 | 956 | 928 | 956 | 907 | 881 | 885 | 911 | 878 | 905 | | | | | |
| Medium..... | | | | | | 1,761 | | | | | | 904 | | | | | | 853 | 853 | 832 | 813 | | |
| Low..... | | | | | | 1,661 | | | | | | 853 | | | | | | 796 | 744 | 744 | 809 | 701 | 701 |
| Constant..... | | | | | | 1,776 | | | | | | 912 | | | | | | 912 | 912 | 912 | 864 | 862 | 862 |
| 25 to 29 years: | 1,862 | 1,845 | 1,799 | 1,810 | 1,861 | 1,800 | 954 | 940 | 920 | 926 | 952 | 924 | 909 | 905 | 879 | 883 | 910 | 876 | | | | | |
| 30 to 34 years: | 1,895 | 1,833 | 1,836 | 1,791 | 1,803 | 1,835 | 972 | 946 | 934 | 914 | 921 | 946 | 923 | 906 | 903 | 877 | 882 | 908 | | | | | |
| 35 to 39 years: | 1,542 | 1,882 | 1,840 | 1,825 | 1,781 | 1,794 | 783 | 962 | 938 | 926 | 907 | 914 | 799 | 919 | 903 | 900 | 873 | 880 | | | | | |
| 40 to 44 years: | 1,323 | 1,525 | 1,862 | 1,823 | 1,809 | 1,767 | 662 | 771 | 949 | 928 | 914 | 896 | 662 | 754 | 914 | 898 | 895 | 871 | | | | | |
| 45 to 49 years: | 1,494 | 1,401 | 1,500 | 1,833 | 1,796 | 1,784 | 742 | 646 | 753 | 928 | 906 | 896 | 662 | 754 | 914 | 898 | 895 | 871 | | | | | |
| 50 to 54 years: | 1,516 | 1,451 | 1,265 | 1,462 | 1,788 | 1,754 | 746 | 712 | 621 | 727 | 896 | 876 | 770 | 739 | 644 | 735 | 690 | 888 | | | | | |
| 55 to 59 years: | 1,322 | 1,449 | 1,389 | 1,213 | 1,406 | 1,221 | 617 | 701 | 670 | 586 | 688 | 849 | 704 | 748 | 719 | 627 | 678 | 878 | | | | | |
| 60 to 64 years: | 1,025 | 1,234 | 1,355 | 1,302 | 1,140 | 1,325 | 435 | 562 | 639 | 613 | 537 | 634 | 590 | 672 | 716 | 689 | 602 | 691 | | | | | |
| 65 to 69 years: | 502 | 922 | 1,112 | 1,223 | 1,178 | 1,034 | 211 | 377 | 489 | 557 | 536 | 471 | 291 | 545 | 623 | 565 | 642 | 563 | | | | | |
| 70 to 74 years: | 637 | 423 | 777 | 939 | 1,034 | 1,000 | 267 | 169 | 302 | 394 | 450 | 434 | 370 | 254 | 475 | 545 | 584 | 566 | | | | | |
| 75 to 79 years: | 473 | 475 | 320 | 589 | 714 | 788 | 196 | 186 | 120 | 214 | 281 | 322 | 277 | 289 | 200 | 373 | 433 | 466 | | | | | |
| 80 years and over: | 336 | 411 | 448 | 386 | 514 | 648 | 126 | 154 | 160 | 132 | 170 | 225 | 210 | 257 | 287 | 285 | 344 | 423 | | | | | |

TABLE III.—ESTIMATED AND PROJECTED POPULATION OF PRESCHOOL AGE (0 TO 6 YEARS), BY SEX—EIGHT EASTERN EUROPEAN COUNTRIES, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Country and series | Both sexes | | | | | | Males | | | | | | Females | | | | | | |
|------------------------------------|------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | |
| Eastern Europe: | | | | | | | | | | | | | | | | | | | |
| High..... | 15,405 | 15,295 | 15,426 | 15,642 | 15,925 | 16,022 | 7,902 | 7,852 | 7,920 | 8,031 | 8,177 | 8,229 | 7,503 | 7,443 | 7,507 | 7,611 | 7,748 | 7,794 | |
| Medium..... | | 14,124 | 14,162 | 13,873 | 13,783 | 13,667 | | 7,551 | 7,271 | 7,123 | 7,077 | 7,019 | | 7,159 | 6,892 | 6,750 | 6,648 | 6,567 | 6,468 |
| Low..... | | 14,124 | 12,898 | 12,103 | 11,648 | 11,375 | | 7,250 | 6,622 | 6,214 | 5,981 | 5,841 | | 6,874 | 6,276 | 5,889 | 5,667 | 5,532 | 5,352 |
| Constant..... | | 14,844 | 14,820 | 15,166 | 15,520 | 15,515 | | 7,620 | 7,609 | 7,788 | 7,971 | 7,970 | | 7,224 | 7,211 | 7,378 | 7,547 | 7,545 | |
| Albania: | | | | | | | | | | | | | | | | | | | |
| High..... | 482 | 534 | 539 | 508 | 487 | 503 | 251 | 278 | 280 | 264 | 253 | 261 | 231 | 256 | 259 | 244 | 233 | 241 | |
| Medium..... | | 515 | 502 | 468 | 445 | 454 | | 268 | 261 | 243 | 232 | 236 | | 247 | 241 | 224 | 214 | 218 | |
| Low..... | | 495 | 465 | 427 | 404 | 407 | | 257 | 242 | 222 | 210 | 212 | | 228 | 223 | 205 | 194 | 195 | |
| Constant..... | | 534 | 595 | 636 | 662 | 693 | | 278 | 309 | 331 | 345 | 361 | | 256 | 285 | 305 | 318 | 332 | |
| Bulgaria: | | | | | | | | | | | | | | | | | | | |
| High..... | 862 | 842 | 887 | 936 | 941 | 914 | 442 | 432 | 455 | 481 | 483 | 469 | 420 | 410 | 432 | 456 | 458 | 445 | |
| Medium..... | | 810 | 812 | 828 | 811 | 774 | | 415 | 417 | 425 | 416 | 397 | | 378 | 359 | 350 | 332 | 311 | |
| Low..... | | 777 | 737 | 720 | 683 | 638 | | 398 | 378 | 369 | 351 | 328 | | 395 | 398 | 408 | 401 | 363 | |
| Constant..... | | 811 | 817 | 838 | 824 | 787 | | 416 | 419 | 430 | 423 | 404 | | 395 | 398 | 408 | 401 | 363 | |
| Czechoslovakia: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,670 | 1,599 | 1,670 | 1,815 | 1,855 | 1,786 | 854 | 818 | 854 | 928 | 949 | 914 | 816 | 782 | 816 | 867 | 906 | 872 | |
| Medium..... | | 1,538 | 1,531 | 1,606 | 1,602 | 1,519 | | 786 | 783 | 821 | 819 | 777 | | 751 | 748 | 785 | 783 | 742 | |
| Low..... | | 1,476 | 1,391 | 1,398 | 1,351 | 1,259 | | 755 | 711 | 715 | 691 | 644 | | 721 | 680 | 683 | 660 | 615 | |
| Constant..... | | 1,547 | 1,577 | 1,702 | 1,728 | 1,645 | | 791 | 806 | 870 | 884 | 842 | | 756 | 771 | 831 | 844 | 804 | |
| German Democratic Republic: | | | | | | | | | | | | | | | | | | | |
| High..... | 1,620 | 1,618 | 1,578 | 1,524 | 1,613 | 1,675 | 829 | 831 | 810 | 783 | 829 | 850 | 790 | 788 | 768 | 741 | 785 | 815 | |
| Medium..... | | 1,554 | 1,443 | 1,346 | 1,394 | 1,421 | | 798 | 741 | 691 | 716 | 730 | | 757 | 702 | 655 | 678 | 691 | |
| Low..... | | 1,490 | 1,307 | 1,167 | 1,175 | 1,175 | | 765 | 671 | 599 | 604 | 604 | | 725 | 636 | 568 | 572 | 572 | |
| Constant..... | | 1,542 | 1,391 | 1,255 | 1,274 | 1,292 | | 792 | 714 | 645 | 654 | 664 | | 751 | 677 | 611 | 620 | 629 | |
| Hungary: | | | | | | | | | | | | | | | | | | | |
| High..... | 969 | 913 | 989 | 1,093 | 1,117 | 1,054 | 496 | 466 | 506 | 559 | 571 | 559 | 473 | 447 | 484 | 534 | 546 | 515 | |
| Medium..... | | 877 | 905 | 966 | 964 | 896 | | 448 | 462 | 494 | 493 | 458 | | 429 | 442 | 472 | 471 | 438 | |
| Low..... | | 841 | 820 | 838 | 812 | 742 | | 429 | 419 | 429 | 415 | 380 | | 411 | 401 | 410 | 397 | 363 | |
| Constant..... | | 874 | 893 | 942 | 933 | 866 | | 447 | 456 | 482 | 477 | 443 | | 428 | 437 | 460 | 456 | 423 | |
| Poland: | | | | | | | | | | | | | | | | | | | |
| High..... | 4,737 | 4,649 | 4,340 | 4,290 | 4,479 | 4,710 | 2,428 | 2,385 | 2,227 | 2,203 | 2,300 | 2,420 | 2,309 | 2,264 | 2,112 | 2,087 | 2,179 | 2,291 | |
| Medium..... | | 4,478 | 3,991 | 3,806 | 3,872 | 4,023 | | 2,297 | 2,048 | 1,954 | 1,989 | 2,067 | | 2,180 | 1,943 | 1,852 | 1,863 | 1,956 | |
| Low..... | | 4,307 | 3,643 | 3,323 | 3,266 | 3,350 | | 2,210 | 1,870 | 1,705 | 1,677 | 1,721 | | 2,097 | 1,773 | 1,617 | 1,589 | 1,629 | |
| Constant..... | | 4,544 | 4,303 | 4,421 | 4,728 | 4,953 | | 2,391 | 2,208 | 2,270 | 2,428 | 2,546 | | 2,213 | 2,094 | 2,151 | 2,300 | 2,410 | |
| Romania: | | | | | | | | | | | | | | | | | | | |
| High..... | 2,498 | 2,538 | 2,780 | 2,807 | 2,745 | 2,687 | 1,279 | 1,302 | 1,426 | 1,439 | 1,407 | 1,378 | 1,219 | 1,236 | 1,354 | 1,368 | 1,398 | 1,309 | |
| Medium..... | | 2,439 | 2,555 | 2,491 | 2,371 | 2,284 | | 1,251 | 1,310 | 1,277 | 1,216 | 1,171 | | 1,188 | 1,245 | 1,214 | 1,155 | 1,113 | |
| Low..... | | 2,339 | 2,330 | 2,174 | 1,999 | 1,893 | | 1,200 | 1,195 | 1,115 | 1,025 | 971 | | 1,139 | 1,135 | 1,059 | 974 | 923 | |
| Constant..... | | 2,476 | 2,746 | 2,868 | 2,862 | 2,788 | | 1,271 | 1,408 | 1,470 | 1,467 | 1,423 | | 1,206 | 1,338 | 1,397 | 1,395 | 1,359 | |
| Yugoslavia: | | | | | | | | | | | | | | | | | | | |
| High..... | 2,567 | 2,600 | 2,643 | 2,668 | 2,689 | 2,694 | 1,322 | 1,340 | 1,362 | 1,375 | 1,365 | 1,388 | 1,245 | 1,261 | 1,282 | 1,294 | 1,304 | 1,306 | |
| Medium..... | | 2,500 | 2,424 | 2,363 | 2,323 | 2,308 | | 1,288 | 1,249 | 1,217 | 1,197 | 1,183 | | 1,212 | 1,175 | 1,146 | 1,126 | 1,113 | |
| Low..... | | 2,399 | 2,305 | 2,057 | 1,958 | 1,908 | | 1,236 | 1,136 | 1,059 | 1,009 | 983 | | 1,163 | 1,069 | 997 | 950 | 925 | |
| Constant..... | | 2,515 | 2,498 | 2,504 | 2,508 | 2,489 | | 1,296 | 1,287 | 1,290 | 1,292 | 1,282 | | 1,220 | 1,211 | 1,214 | 1,216 | 1,207 | |

TABLE IV.—ESTIMATED AND PROJECTED POPULATION OF PRIMARY SCHOOL AGE (7 TO 14 YEARS), BY SEX—EIGHT EASTERN EUROPEAN COUNTRIES, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Country and series | Both sexes | | | | | Males | | | | | Females | | | | | | | | | | |
|------------------------------------|------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1985 | 1990 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | | | | |
| Eastern Europe: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 17,411 | 17,849 | 17,357 | 17,551 | 17,676 | 18,024 | 8,918 | 9,141 | 8,899 | 9,004 | 9,069 | 9,249 | 8,493 | 8,708 | 8,458 | 8,547 | 8,607 | 8,775 | | | |
| Medium..... | | | 17,066 | 16,428 | 15,952 | 15,762 | | | 8,749 | 8,428 | 8,185 | 8,088 | | | 8,316 | 8,000 | 7,767 | 8,175 | 7,454 | 6,927 | 6,573 |
| Low..... | | | 16,774 | 15,305 | 14,227 | 13,501 | | | 8,600 | 7,851 | 7,300 | 6,928 | | | 8,352 | 8,201 | 8,305 | 8,535 | | | |
| Constant..... | | | 17,059 | 16,841 | 17,058 | 17,534 | | | 8,756 | 8,640 | 8,753 | 8,999 | | | | | | | | | |
| Albania: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 519 | 529 | 579 | 617 | 596 | 561 | 270 | 276 | 301 | 320 | 310 | 291 | 249 | 254 | 278 | 296 | 286 | 269 | | | |
| Medium..... | | | 569 | 581 | 552 | 515 | | | 296 | 302 | 297 | 268 | | | 273 | 279 | 265 | 247 | | | |
| Low..... | | | 559 | 546 | 507 | 468 | | | 290 | 264 | 263 | 243 | | | 268 | 262 | 243 | 225 | | | |
| Constant..... | | | 573 | 640 | 701 | 738 | | | 298 | 332 | 364 | 363 | | | | | | | | | |
| Bulgaria: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,069 | 1,033 | 958 | 981 | 1,041 | 1,076 | 547 | 529 | 490 | 503 | 534 | 552 | 522 | 505 | 467 | 478 | 507 | 524 | | | |
| Medium..... | | | 942 | 917 | 936 | 939 | | | 482 | 470 | 480 | 481 | | | 460 | 447 | 456 | 457 | | | |
| Low..... | | | 926 | 852 | 832 | 801 | | | 474 | 437 | 427 | 411 | | | 452 | 415 | 405 | 390 | | | |
| Constant..... | | | 942 | 920 | 945 | 952 | | | 482 | 472 | 485 | 488 | | | | | | | | | |
| Czechoslovakia: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 2,110 | 2,051 | 1,831 | 1,859 | 1,987 | 2,114 | 1,078 | 1,048 | 936 | 950 | 1,016 | 1,081 | 1,032 | 1,003 | 895 | 909 | 971 | 1,033 | | | |
| Medium..... | | | 1,801 | 1,738 | 1,789 | 1,846 | | | 921 | 888 | 915 | 944 | | | 860 | 850 | 874 | 902 | | | |
| Low..... | | | 1,770 | 1,618 | 1,592 | 1,577 | | | 905 | 827 | 814 | 806 | | | 865 | 791 | 778 | 771 | | | |
| Constant..... | | | 1,809 | 1,767 | 1,869 | 1,976 | | | 922 | 903 | 956 | 1,010 | | | 881 | 864 | 914 | 966 | | | |
| German Democratic Republic: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,585 | 1,767 | 1,845 | 1,840 | 1,752 | 1,783 | 812 | 903 | 945 | 944 | 900 | 915 | 774 | 864 | 901 | 896 | 853 | 868 | | | |
| Medium..... | | | 1,814 | 1,717 | 1,574 | 1,554 | | | 928 | 881 | 808 | 798 | | | 886 | 836 | 766 | 756 | | | |
| Low..... | | | 1,782 | 1,595 | 1,396 | 1,326 | | | 912 | 818 | 717 | 681 | | | 870 | 777 | 680 | 645 | | | |
| Constant..... | | | 1,811 | 1,683 | 1,494 | 1,432 | | | 927 | 864 | 767 | 735 | | | 884 | 820 | 727 | 697 | | | |
| Hungary: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 1,320 | 1,246 | 1,046 | 1,085 | 1,189 | 1,276 | 679 | 639 | 534 | 554 | 608 | 652 | 641 | 607 | 512 | 531 | 581 | 624 | | | |
| Medium..... | | | 1,028 | 1,013 | 1,058 | 1,113 | | | 525 | 517 | 546 | 569 | | | 495 | 495 | 522 | 544 | | | |
| Low..... | | | 1,011 | 940 | 947 | 950 | | | 516 | 480 | 484 | 485 | | | 503 | 460 | 463 | 464 | | | |
| Constant..... | | | 1,028 | 1,005 | 1,048 | 1,081 | | | 525 | 513 | 535 | 552 | | | 503 | 492 | 512 | 528 | | | |
| Poland: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 4,750 | 5,245 | 5,386 | 5,115 | 4,865 | 4,981 | 2,427 | 2,663 | 2,760 | 2,623 | 2,506 | 2,557 | 2,322 | 2,562 | 2,626 | 2,491 | 2,378 | 2,424 | | | |
| Medium..... | | | 5,298 | 4,796 | 4,414 | 4,352 | | | 2,715 | 2,460 | 2,255 | 2,234 | | | 2,583 | 2,336 | 2,149 | 2,118 | | | |
| Low..... | | | 5,211 | 4,477 | 3,944 | 3,724 | | | 2,670 | 2,296 | 2,024 | 1,912 | | | 2,590 | 2,181 | 1,920 | 1,812 | | | |
| Constant..... | | | 5,315 | 4,994 | 4,937 | 5,209 | | | 2,724 | 2,562 | 2,533 | 2,674 | | | 2,591 | 2,433 | 2,404 | 2,535 | | | |
| Romania: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 3,097 | 3,010 | 2,781 | 3,058 | 3,203 | 3,177 | 1,584 | 1,538 | 1,423 | 1,566 | 1,640 | 1,627 | 1,513 | 1,472 | 1,358 | 1,492 | 1,562 | 1,550 | | | |
| Medium..... | | | 2,733 | 2,863 | 2,893 | 2,776 | | | 1,399 | 1,466 | 1,482 | 1,421 | | | 1,335 | 1,396 | 1,411 | 1,354 | | | |
| Low..... | | | 2,685 | 2,667 | 2,583 | 2,376 | | | 1,374 | 1,366 | 1,323 | 1,217 | | | 1,311 | 1,301 | 1,260 | 1,159 | | | |
| Constant..... | | | 2,742 | 2,982 | 3,216 | 3,266 | | | 1,403 | 1,527 | 1,647 | 1,683 | | | 1,339 | 1,454 | 1,569 | 1,604 | | | |
| Yugoslavia: | | | | | | | | | | | | | | | | | | | | | |
| High..... | 2,961 | 2,968 | 2,931 | 2,997 | 3,024 | 3,056 | 1,521 | 1,525 | 1,509 | 1,543 | 1,557 | 1,573 | 1,440 | 1,442 | 1,421 | 1,454 | 1,467 | 1,483 | | | |
| Medium..... | | | 2,881 | 2,803 | 2,725 | 2,668 | | | 1,484 | 1,443 | 1,403 | 1,373 | | | 1,397 | 1,360 | 1,322 | 1,295 | | | |
| Low..... | | | 2,831 | 2,609 | 2,426 | 2,280 | | | 1,458 | 1,343 | 1,249 | 1,174 | | | 1,373 | 1,266 | 1,177 | 1,106 | | | |
| Constant..... | | | 2,885 | 2,850 | 2,848 | 2,859 | | | 1,486 | 1,467 | 1,466 | 1,472 | | | 1,399 | 1,383 | 1,382 | 1,397 | | | |

TABLE V.—ESTIMATED AND PROJECTED POPULATION OF WORKING AGE (15 TO 64 YEARS), BY SEX—EIGHT EASTERN EUROPEAN COUNTRIES, 1985-2010
(Numbers in thousands as of midyear; figures may not add to totals due to rounding; see text for an explanation of the series)

| Country and series | Both sexes | | | | | | Males | | | | Females | | | | | | | |
|------------------------------------|------------|--------|--------|--------|--------|---------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
| Eastern Europe: | | | | | | | | | | | | | | | | | | |
| High..... | 90,847 | 92,821 | 95,161 | 96,978 | 99,050 | 101,676 | 45,028 | 46,247 | 47,543 | 48,515 | 49,637 | 50,997 | 45,819 | 46,574 | 47,618 | 48,463 | 49,413 | 50,679 |
| Medium..... | | | | | 98,468 | 100,130 | | | | | 49,339 | 50,205 | | | | | 49,129 | 49,926 |
| Low..... | | | | | 97,896 | 98,584 | | | | | 49,040 | 49,412 | | | | | 48,846 | 49,172 |
| Constant..... | | | | | 98,602 | 100,816 | | | | | 49,407 | 50,537 | | | | | 49,194 | 50,259 |
| Albania: | | | | | | | | | | | | | | | | | | |
| High..... | 1,789 | 2,027 | 2,244 | 2,470 | 2,711 | 2,933 | 927 | 1,050 | 1,161 | 1,275 | 1,396 | 1,509 | 862 | 977 | 1,084 | 1,195 | 1,314 | 1,424 |
| Medium..... | | | | | 2,691 | 2,887 | | | | | 1,386 | 1,485 | | | | | 1,305 | 1,402 |
| Low..... | | | | | 2,672 | 2,840 | | | | | 1,376 | 1,460 | | | | | 1,296 | 1,379 |
| Constant..... | | | | | 2,710 | 2,982 | | | | | 1,396 | 1,534 | | | | | 1,314 | 1,448 |
| Bulgaria: | | | | | | | | | | | | | | | | | | |
| High..... | 5,994 | 5,984 | 5,996 | 5,953 | 5,981 | 6,046 | 2,988 | 2,982 | 2,988 | 2,968 | 2,986 | 3,022 | 3,006 | 3,002 | 3,008 | 2,985 | 2,995 | 3,023 |
| Medium..... | | | | | 5,949 | 5,956 | | | | | 2,969 | 2,976 | | | | | 2,979 | 2,979 |
| Low..... | | | | | 5,916 | 5,965 | | | | | 2,953 | 2,930 | | | | | 2,964 | 2,935 |
| Constant..... | | | | | 5,950 | 5,961 | | | | | 2,970 | 2,979 | | | | | 2,980 | 2,982 |
| Czechoslovakia: | | | | | | | | | | | | | | | | | | |
| High..... | 10,009 | 10,264 | 10,659 | 10,899 | 11,181 | 11,374 | 4,956 | 5,103 | 5,317 | 5,446 | 5,590 | 5,692 | 5,053 | 5,161 | 5,342 | 5,453 | 5,591 | 5,681 |
| Medium..... | | | | | 11,120 | 11,205 | | | | | 5,559 | 5,606 | | | | | 5,561 | 5,599 |
| Low..... | | | | | 11,058 | 11,036 | | | | | 5,527 | 5,520 | | | | | 5,531 | 5,516 |
| Constant..... | | | | | 11,129 | 11,253 | | | | | 5,563 | 5,631 | | | | | 5,566 | 5,622 |
| German Democratic Republic: | | | | | | | | | | | | | | | | | | |
| High..... | 11,191 | 11,134 | 11,152 | 11,218 | 11,104 | 11,079 | 5,491 | 5,545 | 5,587 | 5,622 | 5,578 | 5,577 | 5,700 | 5,589 | 5,565 | 5,596 | 5,526 | 5,501 |
| Medium..... | | | | | 11,040 | 10,913 | | | | | 5,545 | 5,492 | | | | | 5,495 | 5,420 |
| Low..... | | | | | 10,976 | 10,746 | | | | | 5,512 | 5,407 | | | | | 5,464 | 5,399 |
| Constant..... | | | | | 11,028 | 10,858 | | | | | 5,539 | 5,465 | | | | | 5,489 | 5,394 |
| Hungary: | | | | | | | | | | | | | | | | | | |
| High..... | 7,043 | 7,026 | 7,097 | 7,029 | 7,005 | 7,004 | 3,459 | 3,462 | 3,508 | 3,481 | 3,479 | 3,486 | 3,585 | 3,565 | 3,590 | 3,548 | 3,526 | 3,518 |
| Medium..... | | | | | 6,969 | 6,902 | | | | | 3,461 | 3,434 | | | | | 3,508 | 3,468 |
| Low..... | | | | | 6,939 | 6,800 | | | | | 3,443 | 3,382 | | | | | 3,491 | 3,418 |
| Constant..... | | | | | 6,967 | 6,889 | | | | | 3,460 | 3,427 | | | | | 3,507 | 3,462 |
| Poland: | | | | | | | | | | | | | | | | | | |
| High..... | 24,203 | 24,816 | 25,649 | 26,706 | 27,745 | 28,750 | 11,968 | 12,311 | 12,757 | 13,306 | 13,845 | 14,347 | 12,235 | 12,505 | 12,892 | 13,401 | 13,900 | 14,403 |
| Medium..... | | | | | 27,575 | 28,316 | | | | | 13,758 | 14,125 | | | | | 13,817 | 14,191 |
| Low..... | | | | | 27,405 | 27,883 | | | | | 13,670 | 13,902 | | | | | 13,794 | 13,980 |
| Constant..... | | | | | 27,640 | 28,643 | | | | | 13,791 | 14,232 | | | | | 13,849 | 14,351 |
| Romania: | | | | | | | | | | | | | | | | | | |
| High..... | 14,973 | 15,402 | 15,827 | 15,966 | 16,269 | 16,952 | 7,453 | 7,691 | 7,910 | 7,988 | 8,155 | 8,505 | 7,520 | 7,711 | 7,917 | 7,981 | 8,114 | 8,445 |
| Medium..... | | | | | 16,170 | 16,680 | | | | | 8,105 | 8,366 | | | | | 8,056 | 8,314 |
| Low..... | | | | | 16,072 | 16,409 | | | | | 8,054 | 8,220 | | | | | 8,018 | 8,181 |
| Constant..... | | | | | 16,208 | 16,973 | | | | | 8,124 | 8,468 | | | | | 8,084 | 8,411 |
| Yugoslavia: | | | | | | | | | | | | | | | | | | |
| High..... | 15,646 | 16,167 | 16,536 | 16,737 | 17,054 | 17,541 | 7,788 | 8,102 | 8,316 | 8,432 | 8,607 | 8,859 | 7,858 | 8,065 | 8,221 | 8,305 | 8,447 | 8,682 |
| Medium..... | | | | | 16,954 | 17,273 | | | | | 8,556 | 8,721 | | | | | 8,398 | 8,552 |
| Low..... | | | | | 16,854 | 17,005 | | | | | 8,505 | 8,583 | | | | | 8,350 | 8,422 |
| Constant..... | | | | | 16,970 | 17,350 | | | | | 8,564 | 8,761 | | | | | 8,406 | 8,590 |

TABLE VI.—ESTIMATED AND PROJECTED POPULATION OF RETIREMENT AGE (65 YEARS AND OVER),
BY SEX—EIGHT EASTERN EUROPEAN COUNTRIES, 1985–2010

[Numbers in thousands as of midyear; figures may not add to totals due to rounding]

| Sex and country | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
|----------------------------------|--------|--------|--------|--------|--------|--------|
| Both sexes: | | | | | | |
| Eastern Europe | 14,091 | 15,181 | 16,634 | 18,125 | 19,195 | 19,355 |
| Albania | 172 | 196 | 233 | 273 | 324 | 374 |
| Bulgaria | 1,019 | 1,152 | 1,260 | 1,347 | 1,349 | 1,340 |
| Czechoslovakia | 1,710 | 1,842 | 1,920 | 1,961 | 1,943 | 2,050 |
| German Democratic Republic | 2,253 | 2,123 | 2,133 | 2,258 | 2,557 | 2,671 |
| Hungary | 1,317 | 1,397 | 1,444 | 1,470 | 1,465 | 1,497 |
| Poland | 3,513 | 3,823 | 4,248 | 4,618 | 4,802 | 4,701 |
| Romania | 2,159 | 2,418 | 2,740 | 3,062 | 3,314 | 3,251 |
| Yugoslavia | 1,948 | 2,230 | 2,657 | 3,137 | 3,440 | 3,470 |
| Males: | | | | | | |
| Eastern Europe | 5,457 | 5,814 | 6,488 | 7,219 | 7,725 | 7,818 |
| Albania | 76 | 86 | 104 | 125 | 150 | 173 |
| Bulgaria | 453 | 503 | 543 | 574 | 565 | 556 |
| Czechoslovakia | 660 | 708 | 737 | 752 | 744 | 798 |
| German Democratic Republic | 739 | 670 | 721 | 841 | 1,021 | 1,091 |
| Hungary | 510 | 531 | 544 | 549 | 540 | 557 |
| Poland | 1,319 | 1,424 | 1,605 | 1,771 | 1,849 | 1,809 |
| Romania | 901 | 1,006 | 1,161 | 1,311 | 1,419 | 1,382 |
| Yugoslavia | 800 | 885 | 1,071 | 1,297 | 1,437 | 1,452 |
| Females: | | | | | | |
| Eastern Europe | 8,634 | 9,367 | 10,146 | 10,907 | 11,470 | 11,537 |
| Albania | 96 | 110 | 128 | 148 | 174 | 200 |
| Bulgaria | 566 | 649 | 716 | 773 | 784 | 785 |
| Czechoslovakia | 1,051 | 1,134 | 1,183 | 1,209 | 1,199 | 1,252 |
| German Democratic Republic | 1,514 | 1,453 | 1,412 | 1,418 | 1,536 | 1,580 |
| Hungary | 806 | 865 | 900 | 922 | 925 | 940 |
| Poland | 2,194 | 2,399 | 2,643 | 2,846 | 2,953 | 2,892 |
| Romania | 1,258 | 1,413 | 1,579 | 1,750 | 1,895 | 1,870 |
| Yugoslavia | 1,149 | 1,344 | 1,585 | 1,840 | 2,003 | 2,018 |

III. DEFENSE

OVERVIEW

By Richard F Kaufman*

This section contains an examination of the defense sectors of the East European members of the Warsaw Pact from a variety of perspectives. Using different methodologies, the authors find that by nearly all measures military activities have been slowing down in recent years. Those who project future trends expect continued slowdowns as governments seek resources to solve economic problems, and as pressures diminish from Moscow for increased military efforts.

James L. Bielli shows that while the Soviets achieved moderate success in getting the East Europeans to expand and modernize their armed forces in the 1960's, the growth in procurement slowed markedly after 1975. This trend corresponds with reduced rates of GNP growth throughout the region. (See Table 1 of Bielli's paper.) In the 1980's, defense procurement was reduced in absolute terms in all six non-Soviet members of the Warsaw Pact. As a result, ground forces employ outdated weapons and have not maintained adequate inventories, the disparity with Soviet aircraft has widened, and navies are composed of fleets of aging vessels.

Bielli attributes the slowdown primarily to top-level decisions to reallocate resources from defense to the civilian economy. But he also identifies other contributing factors. These include reduced concern in some of the countries about the threat from NATO, weapons manufacturing problems, and material and energy shortages and transportation bottlenecks.

The author expects East European overall defense spending to decline in the wake of Soviet leader Mikhail Gorbachev's announcements of unilateral reductions in Soviet forces, and he speculates about the types of weapons most likely to be affected. If economic performance continues to be poor, the slowdown in defense could go further, depending upon developments in East-West relations.

Shelley Deutch examines the evolution of the East European defense industries and the influence on them of Soviet demands on the one hand, and economic constraints on the other. The Soviets, have urged their Warsaw Pact allies to increase military-economic integration, accept Pact-wide military standards, engage in extensive industrial cooperation, and specialize in certain types of military equipment. From Moscow's standpoint, a large role for the East Europeans can reduce the military burden on the Soviets.

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The East European countries do assume substantial military responsibilities. They have an extensive industrial infrastructure and the defense industries produce large numbers of weapons and military equipment. There has been increasing specialization in areas encouraged by Moscow and items that can be exported to the Third World such as small arms and ammunition. There is also significant production of cargo and utility aircraft, smaller naval vessels, combat support equipment for ground forces, and tactical missiles. Although the Soviets produce the first line tanks, combat aircraft, and ships, the East Europeans contribute subcomponents and manufacturing equipment and under a CEMA program individual countries have specific responsibilities for advanced technology areas.

Nevertheless, as Deutch points out the goals of the East European countries do not always coincide with those of the Warsaw Pact and the role played by the East European defense industries is constrained by economic factors. The East Europeans tend to avoid expensive modernization efforts, prefer their own weapons designs even though others are available, and place greater emphasis on satisfying consumer demand than do the Soviets. In most countries the industrial base is still dependent upon lagging technology and labor-intensive equipment.

The East Europeans are reluctant to increase defense spending or investment for defense production and the rate of modernization of their defense industries significantly lags behind that of the Soviets. An additional potential problem is Gorbachev's proposals that East Europe increase its exports of modern civilian machinery to the Soviet Union. The author concludes that balancing this request and the requirements for military production and modernization of the defense industries promises to create tensions between the Soviets and their allies.

Daniel N. Nelson analyzes the complex way in which military efforts are distributed among the Warsaw Pact countries. Nelson distinguished between military effort and defense burden. Military effort includes the extraction of resources from the economy for defense as well as other military performance contributions such as conducting maneuvers, production and export of arms, and deployment of forces abroad. The "burden" refers only to the costs of the resources, or their opportunity costs, used for defense.

The author constructs indices intended to measure the relative extractive and performance contributions of the Pact members over the period 1975-85. The indices show that after the Soviet Union, Bulgaria, Czechoslovakia, and Poland score the highest of the East European countries, followed by East Germany, Romania, and Hungary.

Contrary to what might have been expected, improved East-West relations in the past was not associated with lower military spending and manpower levels, and the heightened superpower tensions of the early 1980's did not substantially change extractive patterns. But performance effort did increase when relations deteriorated and in response to domestic instability. The data suggest that the Pact countries respond in its performance to short-term political changes, but not in its extractive programs.

Nelson also finds that military effort is substantially dispersed within the Warsaw Pact, that the members contribute heavily to manpower, specialize in certain military activities, and respond to crises within the alliance with greater performance efforts. He concludes that the Pact can no longer be considered a *de facto* military occupation, and the military efforts of the East European members appear more responsive to internal socioeconomic and political conditions than to Soviet pressures.

The paper by Thad P. Alton and others contains estimates of overall defense spending based primarily on official statistics from each of the East European countries. Estimates are shown in the currencies of the countries and in U.S. dollars. The methods used for making the estimates are discussed in some detail.

Adjustments are made to the official figures to take into account certain omissions. For example, some military manpower costs and research and development are believed to lie outside the official defense budgets. It is acknowledged that some omitted costs, such as a portion of investment for arms production, are not captured in the authors' estimates. There are also distortions from the prices assigned to military activities that probably understate the real costs. The authors emphasize the shortcomings in the official statistics and the uncertainties in their own estimates.

Alton's estimates show annual rates of growth under 2 percent for five of the six countries for 1986 and 1987, calculated in constant dollars (only Bulgaria fell outside this group with a 2.8 percent rate). This figure is slightly higher than the average for 1980-85, but slightly lower than it was in 1975-80.

The effects of the omissions and price distortions in the official statistics on the size of the defense programs are seen in the estimates of defense as a share of GNP. The percentage of GNP spent in Eastern Europe as a whole for the years 1975-87 is more than twice as high when estimated in dollars than in the domestic currencies (roughly 6.6 percent in dollars versus 3.0 percent in domestic currencies).

Collectively, the East European defense effort is far from negligible. Alton estimates that the number of regular, active forces of the six countries amount to more than one-half of that of the United States, and that expenditures when measured in dollars total more than one-fifth of U.S. defense outlays.

In his interpretive comment, Keith Crane examines the data that indicate East Europe's contributions to the Warsaw Pact are declining, assesses the various methodologies used in the West for making estimates, and seeks an explanation for the trends. He finds that while none of the methodologies is perfect, and some are more reliable than others, used judiciously they indicate changes in the importance and priorities given the military. His review of the estimates made by the authors in this chapter, as well as those made elsewhere, leads him to the finding that adjusted for inflation military spending in the region stagnated or declined in the 1980's. In addition, substantial cuts for 1989 have been announced in Hungary and Poland, and East Germany has significantly reduced the growth rate for 1989.

Crane believes both economic and political factors account for the decisions to reduce military spending. The 1980's have been a

decade of recession for all the East European countries and economic hardship has affected the military. Governments have had to pay a stiff price for the failures of past policies and the rigidities of their economic systems.

At present, there are political reasons for not increasing defense budgets. These reasons vary from the Stalinist government of Romania's policy of restricting its contribution to the Warsaw Pact, to the liberal government of Hungary's skepticism about the need for greater defense expenditures. A common political denominator is the disappearance of Soviet pressures on the East Europeans for increased military efforts.

TRENDS IN NON-SOVIET WARSAW PACT DEFENSE PROCUREMENT

By James L. Bielli*

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SUMMARY

The growth in military procurement in the non-Soviet Warsaw Pact (NSWP) has slowed since the middle of the 1970's. As a result, the gap between Soviet and NSWP military capabilities has been widening. At a time when the Soviets themselves are promising to reduce defense expenditures and weapons production, the NSWP countries are unlikely to reverse this trend. Indeed, most NSWP regimes have already pledged to implement cuts in defense, and, given the serious problems of their economies, they all are likely to press the limits of Soviet tolerance for further reductions in the few years ahead.

I. PRE-GORBACHEV PUSH FOR NSWP FORCE DEVELOPMENT

Moscow's pressure on its NSWP allies to expand and modernize their armed forces burst into the open at the 1978 meeting of the Political Consultative Committee of the Warsaw Pact, where the Soviets reportedly called for substantial increases in Pact defense outlays in response to planned increases in NATO defense spending. At the time, this proposal was met with strong, vocal opposition from Romania and a lukewarm response from Poland and Hungary. Romania's Ceausescu not only opposed the Soviet proposal, but took the unusual step of publicizing the controversy.

Similar Soviet efforts to pressure the other members of the Warsaw Pact evidently had begun many years before. True, little was done in the first 5 years after the Warsaw Pact's founding in 1955 to make it an integrated military alliance. There was only one

* Office of Soviet Analysis, Central Intelligence Agency.

joint exercise, and the NSWP military establishments remained little more than national defense forces with minimal responsibility for offensive operations against NATO.¹ In the early 1960's, however, the Soviets made a concerted effort to upgrade the combat capabilities of the East European military forces. In particular, in 1960 Krushchev began to stress closer Soviet military integration with Eastern Europe. Joint exercises, organizational changes, and a major arms modernization program lasting through the early 1970's—featuring such weapons as T-55 tanks, MIG-21 Fishbed aircraft, and surface-to-air missiles (SAM's)—substantially upgraded NSWP capabilities for theater operations. The emphasis in this upgrading appeared to be on the Northern Tier countries—Czechoslovakia, East Germany, and Poland—the U.S.S.R.'s key allies in the western theater.

In the late 1960's, while this equipment still was being acquired, the wartime role of the NSWP forces evidently also was enhanced. A marked increase in joint exercises, coupled with more extensive and sophisticated military training, suggested that the NSWP forces had begun to be assigned more significant offensive missions against NATO.² This shift entailed a greater Soviet reliance on the NSWP forces and a new Soviet emphasis on modernizing these forces and improving their war-fighting capabilities.

In addition, a more centralized, formal system for Warsaw Pact defense and armaments planning was established in 1969 to replace the pattern of more informal, bilateral coordination that had existed since the mid-1950's.³ Subsequently, Moscow apparently used this mechanism in an effort to press its NSWP allies to increase their defense outlays and to undertake an ambitious modernization program that would bring their combat units more in line with the equipment levels and organizational structure of Soviet forces.

II. NSWP RESPONSE

In response to such Soviet pressure, the NSWP countries have made notable progress in modernizing some parts of their forces. Specifically, since the early 1970's, they have:

- Nearly doubled the number of armed troop carriers in their ground forces, to include a large number of BMP infantry fighting vehicles.
- Replaced much of their towed antitank artillery with vehicle-mounted or man-portable antitank guided missiles and replaced some of their towed antiaircraft guns with mobile SAM's.
- Upgraded their tactical combat aircraft by replacing MIG-17 Frescoes and early model MIG-21 Fishbeds with some advanced MIG-21 versions and MIG-23 Floggers and by recently

¹ For a discussion of the evolution of the Warsaw Pact, see Dale R. Herspring, "The Warsaw Pact at 25," *Problems of Communism* (September-October 1980), pp. 1-15; Malcolm MacKintosh, "The Warsaw Treaty Organization: A History," *The Warsaw Pact: Alliance in Transition*?, ed. David Holloway and Jane M. O. Sharp (Ithaca: Cornell University Press, 1984), pp. 41-58.

² For a discussion of the wartime role of the Northern-Tier NSWP forces, see A. Ross Johnson et al., *East European Military Establishments: The Warsaw Pact Northern Tier* (New York: Crane Russak, 1980), pp. 17-139.

³ Herspring, op. cit., p. 5.

introducing limited numbers of MIG-29 Fulcrums into the East German air force.⁴

—Upgraded segments of their tank forces with the gradual acquisition of T-72 tanks.

Despite these accomplishments, the overall pace of NSWP military modernization has been slower than that of the Soviets. As a result, the gap in military capabilities between Soviet and NSWP forces has widened further.⁵ Domestic development priorities, economic problems (notably, payments on a rising foreign debt), and in some cases social unrest fostered by rising prices and austerity measures have caused the East Europeans to fall short of Moscow's ambitious demands.

A. SLOW OVERALL GROWTH IN PROCUREMENT

Statements by East European officials indicate that within the NSWP countries military spending has been closely linked to economic performance. Ambitious Soviet plans for increased Pact military spending, such as those proposed at the 1978 meeting of the Political Consultative Committee, clearly were viewed by at least some NSWP countries as unrealistic—given the slowdown in their economic growth. More modest compromise goals probably were agreed upon.

Although there have been no repeat authoritative estimates of spending for NSWP military procurement in indigenous currencies, estimates of the U.S. dollar value of such procurement have been made which attempt to reflect what it would cost to produce the NSWP equipment in the United States at prevailing United States prices, wages, and efficiencies.⁶ Revised and updated versions of these estimates indicate that growth in military procurement slowed markedly after 1975. Indeed, the NSWP as a whole has witnessed lower average annual rates of growth in defense procurement and in GNP as well since the early 1970's.

TABLE 1.—ESTIMATED AVERAGE REAL GROWTH IN GNP AND DEFENSE PROCUREMENT IN NON-SOVIET WARSAW PACT COUNTRIES, 1971-86^{1 2}

| | [In percent] | | | |
|------------------------------|--------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-86 | 1971-86 |
| Poland: | | | | |
| Gross National Product | 6.5 | 0.7 | 1.0 | 2.6 |
| Procurement | 7.6 | -3.9 | -8 | 9 |
| East Germany: | | | | |
| Gross National Product | 3.5 | 2.3 | 1.8 | 2.5 |
| Procurement | 5.6 | 3.6 | -2.8 | 1.8 |
| Czechoslovakia: | | | | |
| Gross National Product | 3.4 | 2.2 | 1.4 | 2.2 |
| Procurement | 8.1 | .7 | -1.5 | 2.2 |
| Romania: | | | | |
| Gross National Product | 6.7 | 4.0 | 2.6 | 4.3 |

⁴ See "East German MIG-29's Go Into Operation," *Jane's Defence Weekly*, vol. 10, No. 7 (Aug. 20, 1988), p. 290.

⁵ For a discussion of NSWP force modernization, see Richard C. Martin, "Warsaw Pact Force Modernization: A Closer Look," *Parameters*, vol. 15, No. 2 (Summer 1985), pp. 3-11.

⁶ See, for example, Joint Economic Committee of Congress, *Allocation of Resources in the Soviet Union and China, 1986*, Washington, DC, United States Government Printing Office, 1988, Part 12, p. 167-175.

TABLE 1.—ESTIMATED AVERAGE REAL GROWTH IN GNP AND DEFENSE PROCUREMENT IN NON-SOVIET WARSAW PACT COUNTRIES, 1971-86^{1 2}—Continued

| | [In percent] | | | |
|-----------------------------|--------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-86 | 1971-86 |
| Procurement..... | 5.2 | 3.4 | -3.9 | 1.2 |
| Bulgaria: | | | | |
| Gross National Product..... | 4.7 | 1.0 | 1.5 | 2.3 |
| Procurement..... | 1.3 | 6.4 | -8 | 2.1 |
| Hungary: | | | | |
| Gross National Product..... | 3.3 | 2.0 | .9 | 2.0 |
| Procurement..... | 1.6 | 4.1 | -6.1 | .5 |
| NSWP (area-wide average): | | | | |
| Gross National Product..... | 4.9 | 1.9 | 1.5 | 2.7 |
| Procurement..... | 5.1 | 1.3 | -2.4 | 1.1 |

¹ Procurement growth rates are calculated from estimates using 1985 U.S. dollars. Although 1986 is the most recent year for which procurement growth rates are available, there appears to have been little significant change in NSWP procurement trends since then.

² GNP growth rates are based on estimates in indigenous currencies.

Source: L.W. International Financial Research, Inc., Research Project on National Income in East Central Europe, Occasional Paper No. 100, (New York: L.W. International Financial Research, 1987).

In the Northern Tier countries, the falloff in the growth of procurement after 1975 was most pronounced in Poland. Measured in U.S. dollar terms, Polish defense procurement declined absolutely during the 1976-86 period, as the regime grappled with pressing economic and social problems. In Czechoslovakia, a country with smaller but better equipped military forces, procurement growth slowed to a crawl in the second half of the 1970's and then fell in absolute terms in the first half of the 1980's. East Germany, with its relatively healthy economy, was able to maintain a respectable level of procurement growth throughout the 1970's, and its armed forces won a well-deserved reputation as the best equipped in the non-Soviet Warsaw Pact. Real declines in East German procurement occurred in the 1980's, however, as the national leadership turned its attention to reversing the slowdown of the economy.

In the NSWP's Southern Tier, the reasons behind the differing rates of growth in procurement are more difficult to explain. The rapid growth of procurement in Bulgaria and Hungary in the latter half of the 1970's, for example, may have been more a reflection of the low level of procurement at the beginning of the period than of a major effort to modernize their forces. In any event, procurement in both countries declined in real terms in the 1980's. On the other hand, the rate of growth in Romanian military procurement declined throughout the seventies and into the eighties as its economic performance steadily deteriorated.

Although top-level decisions on resource allocation probably were primarily responsible for the slow pace of East European military procurement, other factors evidently played a contributing role. The reluctance of NSWP countries to support higher defense spending probably was reinforced to some degree by varying East European appraisals of the likely NATO threat. Warsaw Pact military planning in those years reflected a growing concern about NATO's offensive capabilities, but given their different historical relationship with the West, at least some East European regimes probably were less concerned than the Soviets that NATO would initiate an attack.

In addition, weapons manufacturing problems probably placed some constraint on military procurement from domestic production, although the reliance of the NSWP countries on imported Soviet arms made it unlikely that production problems would have interfered significantly with overall procurement over an extended period of time. Materials and energy shortages and transportation bottlenecks also could have slowed procurement of combat support equipment, much of which was produced domestically.⁷

B. PROCUREMENT TRENDS BY WEAPON TYPE

1. Land Arms⁸

The NSWP countries have only slowly modernized their ground forces since the mid-1970's. As a result, they have not maintained adequate inventory levels in the categories of equipment most critical to the Soviet conventional strategy, which historically has been based on integrated conventional firepower and combined-arms maneuver tactics.

For example:

- Some NSWP countries, notably Poland, still field large numbers of World War II-vintage towed artillery.
- The East Europeans are receiving the T-72 tank only gradually. Some NSWP countries, such as Poland, also have modest numbers of improved/refitted T-54/55's. Most, however, are equipped with standard T-54/55-series tanks of 1950's vintage, while some still have a few World War II-vintage T-34 tanks in active service.
- Many NSWP motorized rifle regiments, primarily in the Southern Tier, are still equipped with trucks, rather than APC's and IFV's.
- Most NSWP ground units still rely on older, towed antiaircraft guns.

2. Aircraft⁹

Despite Soviet pressure on the NSWP countries to modernize these forces, the disparity between Soviet and NSWP air forces in terms of modernity and combat effectiveness has widened in recent decades. Only in their ground attack capabilities have the NSWP air forces shown substantial improvement in recent years. They currently are in the midst of a major upgrade of their ground attack units, replacing obsolescent MIG-17 Frescoes and SU-7 Fitter-As with more modern aircraft. This process is increasing the effectiveness of the NSWP fighter-bomber force, without increasing its size. The primary replacement aircraft, the SU-17 Fitter-K, is being deployed in most NSWP inventories. It has adequate range and payload to fly close support missions for ground forces and can strike deeper interdiction targets, including airfields. The Czechoslovaks, Bulgarians, and Hungarians also are acquiring some SU-

⁷ See Shelley Deutch's article, "The Non-Soviet Warsaw Pact Defense Industries: An Overview," also in this volume.

⁸ For a description of current non-Soviet Warsaw Pact military inventories, see The International Institute for Strategic Studies, *The Military Balance 1987-1988*, (London, 1987), pp. 46-53.

⁹ *Ibid.*

25 Frogfoot aircraft. The SU-25 is a dedicated close air support system but does not offer the interdiction capability of the Fitter-K.

Much of the close air support for NSWP ground forces probably will be provided by attack helicopters. Almost all NSWP countries are acquiring armed versions of the Hip and Hind helicopters. Romania is the only exception; it produces its own armed version of two French helicopters, the Alouette III and the Puma.

NSWP air defense forces are made up primarily of MIG-21 Fishbeds, although each country also has a limited number of MIG-23 Floggers. Few new fighters have been acquired by the NSWP countries in the last 5 years. The East Germans did recently receive a squadron of the modern and more capable MIG-29 Fulcrum aircraft, and other NSWP countries are likely to follow suit.¹⁰ A one-for-one replacement of the sizable number of NSWP Fishbeds with Fulcrums would significantly improve NSWP air defense capabilities. In comparison with the previous aircraft procured by the NSWP forces, however, the cost of the Fulcrum is almost certainly much higher. As a result, large acquisitions of this aircraft are unlikely in the near future.

3. Ships¹¹

The aging NSWP inventory of submarines and ships reflects the secondary position these countries historically have had in Warsaw Pact naval planning for a war with NATO. Frigates and patrol boats will continue to be the main elements of the NSWP naval forces in the foreseeable future. With their limited forces, the Polish, East German, Romanian, and Bulgarian navies appear structured to assist the Soviet Baltic and Black Sea fleets in providing defense against NATO amphibious assaults and in protecting Warsaw Pact sea lines of communication from submarine and surface attack. The NSWP navies also could contribute amphibious forces and carry out mine-clearing operations to support Warsaw Pact ground operations in coastal areas.

Despite apparent past Soviet pressures, only Poland and Romania have appeared willing or able to increase their naval expenditures substantially. Over the long term, the older and less capable weapon systems in the inventories of the NSWP navies probably will be replaced gradually by more capable systems, although—because of budgetary and logistic constraints—on a less than one-for-one basis. Poland, for example, has begun to acquire some modern diesel-powered attack submarines from the Soviet Union. Missile attack boats and a very limited number of frigates, armed with anti-ship cruise missiles and torpedoes, however, are likely to continue to be the backbone of East German and Polish antisurface and antisubmarine warfare forces.

III. CURRENT SITUATION AND OUTLOOK

In his speech to the United Nations on December 7, 1988, Soviet General Secretary Gorbachev promised to make substantial unilateral reductions in his country's military forces during 1989 and

¹⁰ "East German MIG-29's Go Into Operation," loc. cit.

¹¹ *The Military Balance 1987-88*, pp. 46-53.

1990. One month later Gorbachev followed this promise with a pledge to reduce defense expenditures by 14.2 percent and cut weapons production by 19.5 percent during the same 2-year period. These announcements proved to be previews of similar, if less dramatic, promises by the NSWP countries. Responding to their own economic slide and the Soviet military reductions announced by General Secretary Gorbachev, all the NSWP countries except Romania have announced plans to reduce the size of their armed forces and defense expenditures for 1989.

With the exception of Hungary, which has announced plans for a 50-percent reduction in military procurement, no NSWP country has specified by how much its military procurement spending will be reduced as a result of these cuts. Nevertheless, all the NSWP countries have strong incentives to make appreciable reductions in procurement spending and to continue doing so for at least the near term. The high costs associated with acquiring new, modern weapons makes them prime candidates for any defense budget cuts. Furthermore, lowering defense procurement's demands on the East European industrial base could help free up much needed resources for the civilian economy, and several East European countries have announced plans to shift some defense production over to civilian goods. Hungary, for example, has announced a planned 31 percent cut in defense production and Poland has revealed plans to get its defense industries to increase civilian production by 25 percent over the next 2 years. Bulgaria so far has only announced that some defense industrial capacity will be shifted to consumer goods. Some insight into the possible magnitude of the forthcoming cuts in Czechoslovakia was provided during a press conference in mid-February when it was revealed that production of military equipment at one defense plant would decline by 50 percent in 1989.¹²

TABLE 2.—PROMISED NSWP DEFENSE CUTS

| | Defense budget | Troops | Tanks | Armored vehicles | Combat aircraft | Ships | Artillery pieces |
|----------------------------|---------------------------|--------|-------|------------------|-----------------|-------|------------------|
| Poland..... | 4 percent (1989)..... | 40,000 | 850 | 700 | 80 | None | 900 |
| East Germany..... | 10 percent (1989-90)..... | 10,000 | 600 | None | 50 | None | None |
| Czechoslovakia..... | 15 percent (1989-90)..... | 12,000 | 850 | 165 | 51 | None | None |
| Romania ¹ | None..... | None | None | None | None | None | None |
| Bulgaria..... | 12 percent (1989)..... | 10,000 | 200 | None | 20 | 5 | 200 |
| Hungary..... | 17 percent (1989)..... | 9,300 | 251 | 30 | 9 | None | 430 |

¹ Romania claims to have reduced the size of her defense forces and military expenditures by 5 to 10 percent in 1987.

The military equipment most likely to be affected by cuts in procurement include such big ticket items as main battle tanks and combat aircraft. Limiting the purchase of these costly systems would be a quick and easy way to make large savings. To compensate for a decrease in the purchase of these newer, more modern systems the NSWP countries may concentrate on the lower cost alternative of improving already fielded systems. Evidence that this sort of program is already in effect can be seen in the much publicized NSWP effort to modernize aging T-55 tanks. NSWP efforts to

¹² Ceskoslovenska Tiskova Kancelar, report on news conference with Jozef Uhrík, Feb. 15, 1989, Martin, Czechoslovakia, (Prague: CTK in English, Feb. 15, 1989).

upgrade these systems, however, will be tempered by the increasingly high costs associated with maintaining and operating these older weapon systems beyond their intended service lives.

Although NSWP incentives to reduce defense spending are likely to be greater than those for increasing such expenditures, the announced adoption of a new defensive doctrine by the Warsaw Pact could well result in some upward pressure on NSWP procurement plans. While there may be a major decrease in the purchase of such offensive weapon systems as APC's, IFV's, tanks, river-crossing equipment and attack aircraft, the Pact's desire to demonstrate its commitments to a "defensive" doctrine could result in stepped up procurement of such items as antitank guided missiles, interceptors, surface-to-air missiles, and air surveillance networks. Still, defense budget constraints almost certainly will ensure that this shift in procurement priorities will not bring about an overall increase in NSWP procurement levels.

As the NSWP countries begin their 1991-95, 5-year plans, they may seek further defense cuts beyond those already announced if their economies continue to perform poorly. Cuts in NSWP defense spending will not be a panacea for the regions' economic problems—rigid central planning, poor management, obsolescent industrial plants, and a poorly motivated labor force. Nevertheless, a transfer of resources from defense to civilian programs could help bring about temporary improvements in living standards and buy the NSWP regimes time which, if used to effect long-needed reforms, could be crucially important to their stability and staying power.

Given the depth and breadth of the economic problems facing the NSWP countries, the Soviets may be willing to allow additional NSWP spending cuts in at least some instances. Nevertheless, although sympathetic to the East Europeans' economic plight and evidently willing to moderate their demands for NSWP military modernization, the U.S.S.R. will not give free rein to the NSWP countries in the defense sphere. Soviet concerns regarding the state of NSWP combat capabilities and the need for bargaining chips for future arms control negotiations with NATO are likely to limit the extent of any future defense reductions. The prospects for future cuts in NSWP defense spending, therefore, will depend heavily on developments in East-West relations. Moscow probably will be amenable to proposals for further Warsaw Pact defense cuts if improvements in these relations permit a decrease in the size of Warsaw Pact military forces that does not jeopardize the Soviet Union's perceived security interests.

THE NON-SOVIET WARSAW PACT DEFENSE INDUSTRIES: AN OVERVIEW

By Shelley Deutch ¹

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In recent months, all of the non-Soviet Warsaw Pact (NSWP) countries except Romania have announced cuts in their defense budgets, and several have specifically noted their intention to reduce their production of military goods. Their pronouncements have been in sync with those of the Soviets, who have declared their intention to cut military production and spending as well. It is too early to judge the impact or to estimate the magnitude of these changes, but this article provides a baseline against which to evaluate future developments in NSWP weapons production.

I. SUMMARY

The NSWP defense industries currently produce substantial quantities of conventional weaponry and military equipment.² Deliveries to Pact forces have eased the military-industrial burden on the U.S.S.R., while deliveries to foreign clients frequently support Soviet foreign policy. Domestically, NSWP defense industries are a mixed blessing—they advance industrial technology, earn hard currency, and support to varying degrees national independence, but they also siphon off resources that otherwise would boost economic development and improve popular welfare.

The role of the NSWP defense industries has evolved over time, and their activity has become increasingly integrated through a combination of cooperation and specialization agreements. NSWP land arms industries have been upgraded and, with the aid of mutually supplied components and manufacturing equipment, have been preparing to produce more sophisticated systems both for the Pact and for export. The major aircraft producers in the Pact have relinquished production of combat aircraft and settled upon a division of labor in producing other military and civilian aircraft. The NSWP shipbuilding industries have assumed responsibility for some of the less sensitive Pact naval systems and appear to be

¹ Office of Soviet Analysis, Central Intelligence Agency.

² The NSWP countries are Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.

taking on greater responsibility for the production of minor systems and subcomponents.

Over the past decade, NSWP countries have faced mounting challenges to their ability to maintain viable defense industries. Soviet pressure and production requirements for the sophisticated weapons needed to equip Pact forces and to remain competitive in foreign markets have induced NSWP leaders to modernize selected segments of their defense industries. At the same time, leaders have had to cope with economic downturn, lagging technology, and social problems of varying severity. These difficulties, which affect the U.S.S.R. as well, have led to growing national specialization and defense industrial cooperation within the Pact.

II. EVOLUTION OF THE INDUSTRIES

Since World War II and at least until recently, Soviet leaders have consistently supported—indeed demanded—maintenance of a substantial East European defense industrial capability. The commitment by NSWP leaders to building this capability has varied over time because of political, military, economic, and technological considerations. Each of these considerations has varied in importance at different stages in the development of the NSWP defense industries.

A. EARLY DEVELOPMENT

In the early postwar period, Stalin and his legacy of Soviet dominance over the East European economies were the strongest influences. Having stripped the East European industrial base for reparations, the Soviets quickly restructured it to meet Moscow's needs in the postwar world. In Poland and Czechoslovakia, which prior to the war had established large and capable industries, the Soviets took advantage of the skilled labor force to rebuild the industrial base.³ They emphasized development of the aircraft and land arms industries, as well as facilities for civilian heavy-machine building. Bulgaria and Romania, which had been less industrialized before the war, developed more slowly. The Soviets avoided building potentially troublesome military industries in the GDR and, to a lesser extent, Hungary, which they continued to view as politically and militarily unreliable.

All of the NSWP defense industries continued to grow in the 1950's and early 1960's, largely in response to Soviet requirements. Their products consisted primarily of Soviet-designed weapon systems, including tanks, artillery, and jet fighters. Most of these weapons were used to supplement Soviet deliveries to each country's own forces. Manufacturing cooperation among the Pact countries was limited, and little of what was produced in each country was exported to other Pact allies or elsewhere. In the early 1960's, sparked by Khrushchev's call for "socialist economic integration,"³ the Soviets promoted limited coproduction arrangements within the NSWP countries. Integration was constrained, however, by de-

³ See Michael Checinski, *The Interaction of the Soviet and Polish War-Economies in the Framework of CMEA*. West Germany: Forschungsinstitut für Internationale Politik und Sicherheit, 1981.

iciencies such as inadequate technical standardization and by the lack of clearly defined and comprehensive goals for Warsaw Pact force development.

B. GROWING IMPORTANCE

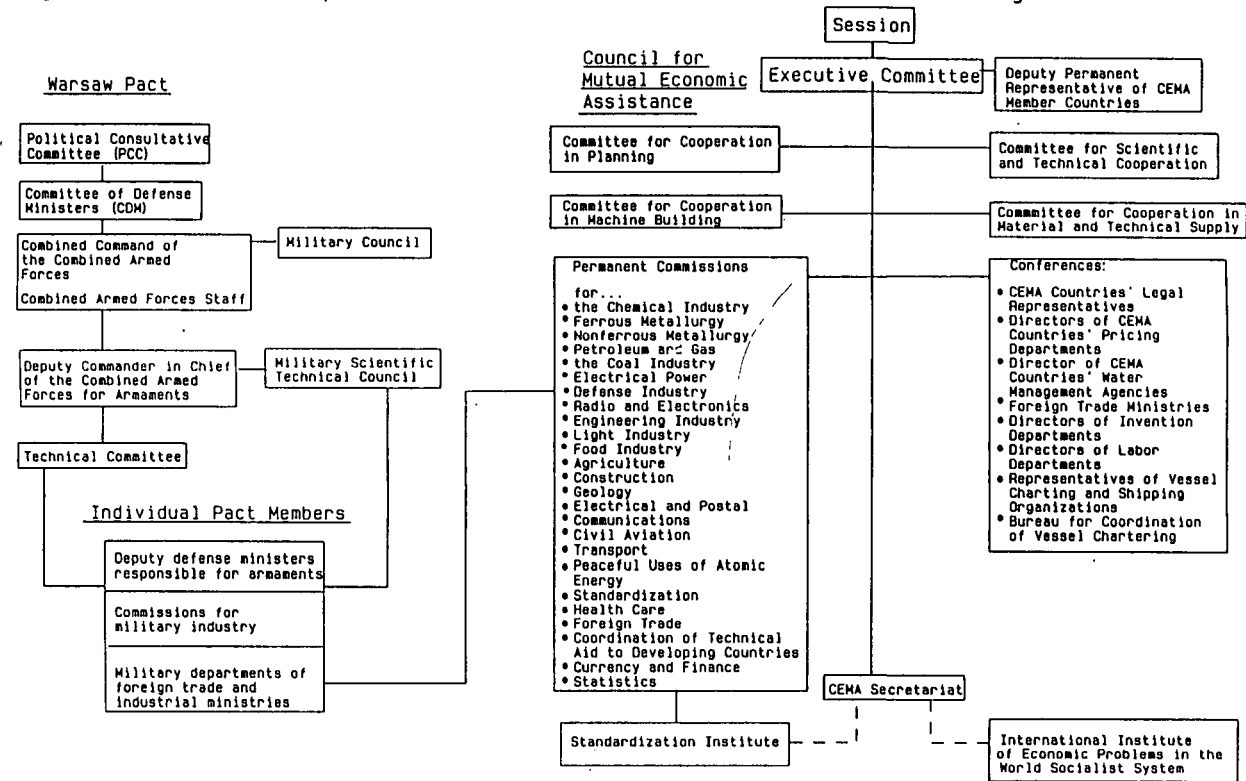
In the mid-to-late 1960's, military factors made the contribution of the NSWP defense industries increasingly important to the Soviets. At that time Soviet planners envisioned an increased role for NSWP forces, assigning them key offensive missions against NATO—albeit on the less critical flanks of the Soviet offensive. The NSWP forces' ability to assume their new roles was jeopardized, however, by their lack of firstline military equipment. At the same time, NSWP governments were staggered by the escalating prices of imported Soviet equipment. Soviet industry was hard pressed to supply established weapons to the allies while simultaneously supplying Soviet forces and upgrading manufacturing technology and capacity.

To rectify these problems, the Soviets attempted to foster increased military-economic integration, emphasizing Pact-wide military standards, extensive industrial cooperation, and specialization.⁴ In 1969 the Soviets set up a highly centralized, formal system for Warsaw Pact defense and armaments planning to coordinate these efforts. (See figure 1.) The Warsaw Pact Combined Armed Forces' Technical Committee, working in conjunction with the Permanent Commission for Defense Industry of the Council for Mutual Economic Assistance (created in the late 1950's), recommends Pact acquisitions, oversees technical standardization, arranges and monitors the fulfillment of defense industry contracts and organizes the division of labor in production and research and development tasks.⁵

⁴ For a firsthand discussion of some of the benefits the Pact hoped to achieve in better organizing defense-industrial cooperation, see V. G. Kulikov, *The Collective Defense of Socialism*. Moscow: Voenizdat, 1982.

⁵ See Michael Checinski, "Warsaw Pact/CEMA Military Economic Trends" in *Problems of Communism*, March-April 1987. See also Petre Nicolae, *CEMA in Theory and Practice*. Falls Church, VA: Delphic Associates, 1984.

Figure 1. Soviet-East European Bureaucracies for Defense Industrial Decision Making



The increased importance of their role in Pact production has given the East European leaders more influence in determining their own economic agendas. The NSWP countries share a number of goals with the U.S.S.R.—to help equip Pact forces, to fill niches in production that Soviet industry cannot or will not accommodate, to lower the costs of defense production, and to use arms exports as an instrument of Pact-agreed foreign policy. NSWP countries also have national goals, however, that sometimes do not mesh with those of the Warsaw Pact. Since the mid-1970's, they have frequently pursued these goals:

- NSWP countries have tended to continue production of older systems—maximizing the cost-effectiveness of long production runs—rather than invest in the expensive modernization required to produce more modern weaponry.
- National priorities have occasionally led countries to produce an indigenously designed weapon for the sake of promoting domestic research and development (R&D), even if other Pact systems were available.
- Differing political priorities have caused NSWP leaders to place greater emphasis on satisfying consumer demand than Moscow has.

In addition, the East Europeans' wish to generate hard currency has occasionally led to production more suited to generating export earnings than meeting Pact military requirements. The NSWP has made a virtue of its limited high-technology base by moving into the world arms market with relatively easy-to-maintain and inexpensive weapon systems that are attractive to Third World customers.

The role played by the East European defense industries has also been circumscribed by the economic environment. While usually protected from the worst economic crises, the industries are an integral part of each country's economic base and therefore are not immune to them. In the past decade, economic growth throughout the Warsaw Pact has been at its lowest since World War II. In the 1970's the East European countries (except Czechoslovakia and Bulgaria) built up huge debts by importing on credit substantial quantities of costly Western machinery and equipment to develop such civilian industries as automotive and consumer electronics. Their failure to make efficient use of this equipment, their inability to boost exports to repay the credits, and their overborrowing led Western banks to cut back drastically on lending. Caught in a serious credit squeeze, Eastern Europe was forced to limit hard currency imports at the cost of industrial investment and consumption.

C. FACING NEW CHALLENGES

Within the past decade, technological considerations have taken on more importance as a determinant of NSWP defense industrial evolution. In the mid-to-late 1970's, the Soviets pressured the NSWP countries to begin production of several more complex systems that required the East Europeans to upgrade production equipment:

- Land arms like the T-72 tank—which Poland and Czechoslovakia began to produce in the early 1980's—require new metal-

lurgical and steel casting technologies and more advanced finishing and welding technologies.

- Sophisticated military electronics and new materials like non-metal composites—which are lighter, more durable, and more resistant to corrosion than many conventional materials—require expensive new equipment (like autoclaves), computer-controlled machinery, and clean production environments.
- The strict tolerances, miniaturized componentry, and complex shapes of modern weapons—especially aircraft and missiles—require precise automated machine tools and other fabrication equipment.

In the U.S.S.R., key defense planners had perceived by the early 1970's the importance of upgrading their defense industrial base to meet the growing military-technological challenges. Accordingly, they began a comprehensive modernization of these industries, including construction of modern manufacturing facilities and the installation of state-of-the-art machinery and equipment.⁶ Emphasis was placed on building up the Soviet industries responsible for producing microelectronics, machine tools, and other advanced manufacturing equipment.

The NSWP countries, however, faced a number of disadvantages that precluded an early attempt to modernize. The Soviets were aided in their modernization efforts by their design strategy of continually improving weapon models and their progression from one generation to the next. Although the industrial base did not improve substantially, at least industrial managers and workers gained experience in bringing new systems on line and smoothing out problems of production assimilation. The NSWP countries do not appear to modify systems already in production as frequently as the Soviets do, and their history of long production runs of only a few models suggests they have only limited experience with assimilating new systems into production. Moreover, competing strong economic concerns made the East Europeans reluctant to substantially increase expenditures for defense or investment in defense production. Unlike Soviet defense industry, which until recently enjoyed almost unquestioned priority status in the U.S.S.R., the NSWP defense industries have had to compete for attention with a number of other economic sectors. For all these reasons, the rate of modernization of East European defense industry has significantly lagged that of Soviet industry.

Nevertheless, in the late 1970's and early 1980's, their taking on of more complicated weapons production tasks has forced the NSWP countries to invest more heavily in their defense industries. They have done so in a patchwork fashion, however, and in general, these industries continue to be hampered by an aging industrial base featuring labor-intensive production machinery.⁷ Delays in

⁶ See *The Soviet Economy Under a New Leader*. Joint report by the Defense Intelligence Agency and the Central Intelligence Agency submitted to the Joint Economic Committee of the U.S. Congress, July 1986.

⁷ Sporadic modernization is probably a more serious problem in some countries than in others. Czechoslovakia has traditionally invested more in industry than the other countries have. Moreover, the higher level of manufacturing technology available in Czechoslovak industry—which is a leading supplier of machine tools and other support technologies to the Soviets—probably has allowed the Czechoslovaks to upgrade their defense industrial base more easily than the other

production occur frequently due to the breakdown of older manufacturing equipment or to defective parts that have been produced on obsolete machinery that cannot function accurately.

III. WEAPON INDUSTRY PROFILES

After the Soviets began pressuring their Warsaw Pact allies in the late 1960's to intensify their defense industrial efforts, these countries initiated production of a broad range of major weapon systems.⁸

A. NATIONAL CONTRIBUTIONS

Each of the NSWP countries has built up its defense industrial capabilities, although to varying extents (see figure 2):

- Poland and Czechoslovakia, the two largest arms producers, have maintained substantial land arms and aircraft industries, and Poland has built extensive naval shipbuilding capabilities as well.
- Bulgaria, since the early 1970's, has built up a significant land arms industry, and has recently begun to create a domestic shipbuilding industry.
- Hungary builds some small artillery systems, but has concentrated its efforts on land arms components for final assembly in other Pact countries and on military electronics equipment.
- East Germany, probably because of Soviet wishes, produces no major land arms or aircraft,⁹ but is a major supplier of military electronics to its Pact allies. It also constructs naval combatants and auxiliary ships for the Soviet and its own navies.
- Romania has established extensive capabilities in the land arms, military aircraft, and naval shipbuilding areas and has exercised almost complete independence in its product lines.

major weapons producers. East German industry is even more technologically proficient than Czechoslovak industry, but it produces no major land arms or aircraft.

⁸ This article focuses on NSWP manufacture of land arms, aircraft, and ships. These systems form the core of the industries, present the most demanding manufacturing challenges, and have been the focus of Soviet efforts to integrate Pact industry and modernize forces. Although these systems probably provide an adequate basis for drawing generalization, it should be noted that small arms, ammunition, and other military-related materiel account for the bulk of total NSWP military production in both quantity and value.

⁹ East Germany tried to build a national aircraft industry in the 1950's but gave up in 1961. The crash of a Ba-152 jet prototype and shortcomings of the Ba-153 turboprop transport as well as economic and industrial problems caused the government to shut it down.

Figure 2.
 Categories of Weapons Produced by the Non-Soviet Warsaw
 Pact Defense Industries Since 1970

| | Land Arms | | | Aircraft | | | | | Naval Ships | | | | |
|----------------|-----------|------------------|-----------|----------|---------|-------------|------------|----------|--------------------------|---------------|--------------------------|--------------------|-------------|
| | Tanks | Armored Vehicles | Artillery | Trainers | Utility | Helicopters | Transports | Fighters | Major Surface Combatants | Patrol Crafts | Amphibious warfare ships | Mine warfare ships | Auxiliaries |
| Bulgaria | | ✓ | ✓ | | | | | | | | | | ✓ |
| Czechoslovakia | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | | | | |
| East Germany | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Hungary | | ✓ | ✓ | | | | | | | | | | |
| Poland | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Romania | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ |

The NSWP has built up a substantial capacity for weapons production, although compared with their Soviet counterpart, the NSWP defense industries remain small. NSWP plants that produce major weapon systems tend to be large facilities that produce major civilian items as well.¹⁰

The selection of the major weapons that each NSWP country will produce is negotiated between the country and the U.S.S.R. The U.S.S.R., acting through the Warsaw Pact, determines which weapon systems will be accepted for official Pact use. NSWP countries have a keen interest in selecting systems that are acceptable to Moscow, since the Warsaw Pact is their largest potential consumer. Romania since the early 1970's has been the exception, producing many systems not certified for Pact use.

When NSWP production is compared to non-U.S. NATO production, the most striking difference is in the systems produced rather than in quantity. The NSWP's primary role as producer of support systems rather than frontline combat gear contrasts with that of the non-U.S. NATO countries, whose more capable industrial bases and competitive marketing goals have led them to produce systems as complex as those produced by the United States. For example, in the past decade non-U.S. NATO produced a majority of all the submarines produced by NATO; the NSWP produced none. Similarly, in the same time period non-U.S. NATO produced thousands of fighter aircraft while the NSWP produced a negligible number.

A comparison of the production of land arms by the NSWP and non-U.S. NATO countries reveals that, whereas both sets of allies have produced similar quantities of the same types of systems in the past decade, massive Soviet land arms production makes the NSWP's share in total Pact production of these systems smaller than non-U.S. NATO's share of NATO's production. In the case of tanks, for instance, both sets of allies produce roughly the same number, yet non-U.S. NATO's production accounts for almost 40 percent of NATO production while the NSWP builds only 20 percent of Pact-produced tanks. In the case of other armored vehicles, non-U.S. NATO produces almost half those produced by NATO, while the NSWP produces only about a third of the Pact's output.

B. PRODUCT ORIENTATION

The major weapons produced by the NSWP defense industries have tended to be relatively less sophisticated and easier to manufacture than systems concurrently in production in Soviet plants. They are often licensed by Moscow near the end of their production runs in the U.S.S.R. This situation appears to have both positive and negative aspects for the East Europeans. Production of aging systems can decrease the competitiveness of exports both within the Pact and abroad, slow down force modernization, and retard the modernization of the defense industrial base. However, contin-

¹⁰ Poland's two major land arms facilities at Stalowa Wola and Labyed, for example, also produce heavy industrial machinery and were ranked 14th and 17th respectively in a list of the top 500 Polish industrial enterprises in sales published in the Polish economic journal *Zarzadzanie*. The two major aircraft plants producing for the military, Mielec and WSK-Swidnik, were ranked 34th and 58th. In Hungary, at least 10 plants producing defense industrial goods appear on the list of the top 100 industrial enterprises for 1985 published in the Hungarian journal *Figyelo*.

ued production of older systems reduces the need for large investments in new manufacturing equipment. The East Europeans may not be overly anxious to take on new systems because of the trade-offs they entail.

Nevertheless, in the past decade NSWP plants have begun to produce a number of new land arms systems whose complexity far exceeds their predecessors. Such systems as the T-72 tank—while not the latest technology by Soviet standards—are straining the capabilities of NSWP plants and the budgets of NSWP economies.

NSWP major weapon systems continue to be predominantly of Soviet design. This is particularly the case in land armaments. Of the 40 models of major land arms produced by NSWP countries since 1960, approximately 90 percent have been of Soviet origin. Although this reliance entails acceptance of Soviet design decisions, the need to buy costly production licenses, and a built-in lag in technology, it has allowed the East Europeans to devote their design and engineering assets to more pressing civilian needs. The U.S.S.R.'s motivations for ensuring the predominance of its weapon designs has probably included a wish to:

- Enhance standardization of Pact forces, thus easing logistical operations.
- Release Soviet facilities for the production of newer systems while providing a continuous source of spare parts for fielded systems.
- Avoid reliance upon its allies for important weaponry.
- Locate repair facilities and sources of standard spare parts and ammunition close to deployed forces in case of war, keeping key weapon assembly plants located in the less vulnerable Soviet interior.
- Continue to sell profitable older systems and production licenses.

Despite the use of Soviet designs, Pact standardization—both in weapon types and manufacturing processes—has not been complete. Although most major land arms are based on Soviet designs, for instance, the East Europeans frequently introduce modifications. The OT-64, a medium, wheeled armored transport based on the Soviet BTR-60, was produced in six different versions in Czechoslovakia and Poland. The Czechoslovak-Polish vehicle, in contrast to its Soviet counterpart, employed different wheel spacing, propulsion by propeller in water, and a single air-cooled diesel engine, the Tatra 928.¹¹

Since the late 1960's, NSWP production of major weapon systems—particularly aircraft and naval systems—has become increasingly specialized. NSWP industry has concentrated on filling niches in production for the Pact that the Soviets have allowed and catering to the less demanding Third World export market:

- Poland and Czechoslovakia ceased production of the MIG-15 and MIG-17 fighters in the early 1960's, and the U.S.S.R. is now the sole producer of the fighters used to modernize NSWP

¹¹ See chapter by John Erickson, "Military Management and Modernization Within the Warsaw Pact," in Clawson, Robert W. and Kaplan, Lawrence S., *The Warsaw Pact: Political Purpose and Military Means*. Wilmington, DE: Scholarly Resources, Inc., 1982.

air forces—the MIG-23, MIG-25, and SU-20.¹² Romania has built up some production capability for jet fighter aircraft, but its output has gone solely to Romanian forces. The NSWP countries have also worked out some division of labor among themselves: Czechoslovakia has primary responsibility for military trainers, for example, and Poland is the foremost producer of utility aircraft.

- Since the late 1950's NSWP countries have produced thousands of transport aircraft, reflecting the lack of sufficient production capacity in the U.S.S.R. to meet Bloc requirements. Most of the transports built by the NSWP are used for civilian purposes, but the inventory military variants of small cargo aircraft such as the Polish AN-2 and Romanian BN-2 and of larger airliners such as the Czechoslovak L-410 and the Romanian ROMBAC 1-11.
- NSWP shipyards have not produced any major combat systems, such as large major surface combatants or submarines. Rather, they have concentrated on smaller naval vessels such as auxiliaries, amphibious ships, mine warfare ships, and patrol craft. They have also produced a few major surface combatants, but these are smaller than most Soviet major combatants and are probably intended for coastal rather than seagoing missions. By ordering auxiliary, amphibious warfare, and now, surface combatant ships from NSWP shipyards, the Soviets free their own to produce more sophisticated warships. Despite their large military production capabilities, however, the NSWP shipbuilding industries produce many more civilian military ships.

All of the NSWP countries also produce large quantities of small arms and ammunition, most of which are exported to the Third World, and Czechoslovakia, Poland, Bulgaria, and Romania produce significant numbers of tactical missiles. The major land arms producers—Poland, Czechoslovakia, Romania, Bulgaria, and Hungary—also manufacture combat support equipment, such as military electronics, bridging equipment, minelayers, military trucks and cranes, and construction and roadbuilding equipment.

Finally, each of the countries—but especially the GDR and Czechoslovakia—produce large quantities of machinery to equip their own and Soviet defense industries. The introduction of more sophisticated weaponry into production has placed heavy demands not just on NSWP defense industry, but also supporting industries that provide subcomponents and production technology. East European industry has made a substantial and growing contribution to Warsaw Pact weapons production either directly or indirectly through the manufacture of subcomponents and manufacturing equipment. Under the CEMA Program for Long-Term Scientific and Technical Cooperation to the Year 2000, the East European countries are assigned specific responsibilities for R&D and production in various advanced technology areas, including electronics, computers, and machine tools.

¹² The Czechoslovaks did assemble a number of MIG-21 fighters at the Vodochody Aircraft Plant in 1967-68, but used wholly Soviet-manufactured parts.

The East Europeans have been particularly active in the microelectronics field. The GDR, Poland, Czechoslovakia, and Bulgaria have built up significant capabilities for the production of microelectronics; the most sophisticated capacities are devoted to Pact military production. Basic microelectronic devices, especially integrated circuits, are critical component in a wide variety of electronic systems for weapons and production equipment. Most of the integrated circuits produced in East European countries and exported to the U.S.S.R. and to each other are probably not shipped directly but are incorporated in finished goods such as readers, computer, and factory automation equipment.

Machine tools are another area in which the East Europeans play an important role. In 1988 the GDR, Czechoslovakia, and Poland ranked 7th, 16th, and 18th, respectively, in world machine tool output. East European machine tool products constituted 30 percent of Soviet machine tool imports in 1988. Although East Germany, Czechoslovakia, and, to a lesser extent, Hungary have done considerable work in advanced machine tools, many of the most sophisticated tools in Eastern Europe are of Western origin¹³

C. COOPERATIVE PRODUCTION ARRANGEMENTS

The NSWP defense industries have been a model of increased cooperation between Soviet and East European industry. They have been closely linked to Soviet counterparts since their establishment, and in the past two decades they have established ties among themselves as well. Moreover, increased coordination of economic planning through CEMA since the early 1970's and Soviet emphasis on increasing integration of the Pact industrial base have led Bloc nations to develop new production arrangements between their defense and other industries.

Cooperative arrangements—or “coproduction”—can take different forms. In one type, one or more countries supply components for final assembly of a weapon system in another country. Alternatively, two or more countries assemble the same weapon system, relying on each other for specific components. Most cooperative arrangements reflect some combination of these two types.

The NSWP countries appear to have cooperative arrangements covering most new land arms systems. The number seems to have increased over the past decade, probably reflecting the growing complexity of modern weapon systems. Cooperation arrangements in the shipbuilding and aircraft industries exist primarily between the individual NSWP countries and the U.S.S.R. rather than between NSWP countries. This probably reflects the smaller demand and more specialized production arrangements for these products.

In recent years the Soviets have been stressing also the value of joint enterprises between Soviet and East European industry joint enterprises, in which each cooperating country owns a share of the operating capital of the joint enterprise and can claim profit ac-

¹³ East European trade journals suggest that the capacity of the East European machine tool industry to build and install advanced machine tools has been limited by a number of factors, including underdeveloped support technologies, such as in computers, software, and robotics; investment shortages that have restricted the supply of critical computer hardware and complementary technologies; and commitment to build large numbers of relatively simple special machine tools or numerically controlled equipment for the U.S.S.R.

cordingly. Joint enterprises can consist of a single enterprise located in one of the countries or two enterprises in different countries between which ties have been established. One of the plants mentioned as a candidate for joint enterprise activity with the U.S.S.R. the Polish Stalowa Wola enterprise, which produces armored vehicles.¹⁴

Despite official emphasis, however, development of cooperative ties has been hindered by the rigidities and imperfections of centralized planning and management and the difficulties of arranging cooperation among centralized economies. Coordination has been hampered by the difficulty of established prices on military products traded within the Warsaw Pact, the rigidity of quotas, the need for bilaterally balanced trade, the lack of direct enterprise incentives, and the need to maneuver through ministerial and foreign trade bureaucracies. In the case of the defense industries, a combination of Soviet pressure and the economic necessity of sharing the burden have engendered a greater degree of cooperation and, therefore, of the resulting problems, than in civilian industry.

Moreover, international cooperation may be advantageous for a country but not necessarily for an enterprise, which may not realize the savings that accrue at the national level. Despite the increasing emphasis on direct enterprise-to-enterprise cooperation, major cooperation and specialization projects in the defense industries have always been and probably always will be decided at the national level. Decisions rest on such factors as the needs to balance trade, meet military requirements, and achieve political harmony with Pact allies. Although enterprise efficiency and profitability are also goals, East European economists have frequently complained that these do not guide the agreements.

The differing costs and efficiencies of the NSWP states could theoretically be reconciled through prices, but because these prices are generally set in transferable rubles—a nonconvertible currency that does not reflect relative resource costs of the trading partners—enterprises participating in cooperative production have no rational way of determining costs. Price setting is complicated by the fact that labor productivity, capital intensity, and the efficiency of investment are computed differently in the various NSWP countries. Furthermore, the Soviets' position as original designers of most Pact equipment affords them considerable leverage over prices and investment.¹⁵

Finally, the production delays and shortfalls that regularly occur in East European industry also dampen enthusiasm for cooperative production. Each country's increased reliance on supplies from the other Pact countries—the result of growing industrial cooperation—has aggravated the problems of its own industries. The Poles with their history of work stoppages appear to have the worst track record, but all of the Pact countries have caused delays at one time or another.

¹⁴ FBIS LD172328, Warsaw PAP, 17 Mar. 1987; FBIS LD202015, Warsaw PAP, 20 Mar. 1987.

¹⁵ For a more detailed discussion of pricing of NSWP-produced military equipment, see Michael Checinski, *The Costs of Armament Production and the Profitability of Armament Exports in COMECON Countries*. Research Paper No. 10, Soviet/East European Research Center.

D. ASSESSMENT OF EAST EUROPEAN PERFORMANCE

When measured against East European performance in other industrial sectors, the NSWP countries appear to have done a reasonable job of running their defense industries. They have built and maintained an extensive industrial infrastructure, and they appear to have sheltered the defense industries from some of the worst problems of their economies. The defense industries, in turn, have produced substantial quantities of weapons and military equipment for hard currency export. NSWP-produced weapons are generally similar to their Soviet-produced counterparts in performance, mean time between repair, and overall quality.

Measured against the goals set for them—primarily by the U.S.S.R.—the performance of the NSWP defense industries has only been fair, however. Some of the shortfalls reflect the problems that typically pervade socialist economies. Unstable deliveries of raw materials and components frequently cause delays and stoppages in production. Bottlenecks due to weather, transportation, labor problems in plants producing component equipment, and other domestic factors cause slippage in weapons production schedules. Labor productivity has traditionally been low throughout the Bloc, and consumption of raw materials and energy high and wasteful.

Other problems—particularly shortfalls in mastering the production of new weapons—also reflect the technical challenges and high costs inherent in maintaining competitive defense industries. The general East European pattern of reequipping factories only when a new system is about to be introduced has meant that a number of plants have been forced to assimilate new systems into production while mastering the use of new production equipment and processes. The challenge this practice poses is reflected in the long period of time it takes for NSWP countries to assimilate systems into production. Assimilation difficulties have been compounded by NSWP industry's skipping of generations of key weapons. For the Soviets, the T-72 tank was not a great advance over the T-62 and T-64, and did not significantly challenge their industry. The Poles and the Czechoslovaks, however, skipped both the T-62 and T-64, and moved directly from the T-55 to the T-72. For them, the T-72 tank—which included upgraded armor, new fire control and night vision systems, an improved drive train and suspension and the addition of a 125-mm smoothbore gun—was a complex system to produce.

IV. OUTLOOK

Like other small countries competing in the international arms market, the NSWP countries have been faced with the increasing costs of remaining competitive in an increasingly tight world market. Unlike most other small countries, however, the NSWP countries have been restricted in their actions by another nation, the U.S.S.R. The future development of the NSWP defense industries depends to a large extent on how Moscow envisions their role.

The current situation holds several advantages for the East Europeans. Profits from the sales of land arms have helped finance expansion of their defense-industrial base, thus lowering the cost of

modernizing their forces. Cooperation allows quicker mastery of new generation equipment than production in one country alone. Specialization in specific weapons or subsystems assures a captive market, helps eliminate costly duplication of effort, and affords opportunities to save resources. By reducing the range of engineering or other products to be developed or produced, a country is able to concentrate its intellectual and material resources and to increase the efficiency with which they are used. Most important, cooperative production has allowed the NSWP states—which lack the Soviets' extensive industrial base—to take on a larger role in potentially profitable weapon programs. Finally, while NSWP purchase of Soviet licenses has meant that the East European military R&D base has remained small, it has been largely freed for the development of profitable goods with both military and civilian applications, such as optics, machine tools, and microelectronics.

The increasing integration of Pact defense industries has also carried a number of disadvantages for the East Europeans, including acceptance of Soviet-set prices, dependence on irregular deliveries, and multiple bureaucracies. Perhaps the most serious disadvantage, however, is that the NSWP defense industries' reliance on Soviet designs, combined with the Soviet policy of licensing only older equipment, has placed a virtual cap on the development of NSWP defense manufacturing capabilities. This cap has meant that the Polish and Czechoslovak defense industries have advanced slowly, remaining locked a generation behind Soviet industry. The younger Bulgarian and Romanian defense industries—encouraged to produce the same generation systems as those produced by the Poles and Czechoslovaks—have gained in capability and will soon be the equal of those more developed allies. But if they continue to follow the same course of integration, these industries too will soon be trapped in a regulated pattern of progress.

Until the mid-1970's the evolution of the NSWP defense industries contribution was probably satisfactory to Moscow. East European industry was playing an important support role by helping to modernize NSWP forces, producing spares for older Soviet systems in NSWP inventories and in those of Soviet clients abroad, and filling niches where Soviet industry could not satisfy demand. Furthermore, the Soviets were able to create a position of monopsony in many products—in which, as the largest buyer, they were actually able to specify what the industry would produce.

As Soviet economic growth slowed, however, the Soviets probably felt a greater East European contribution was necessary to meet the increased demands of Pact force modernization. NSWP production of older and less sophisticated systems was hindering modernization of the NSWP forces at the pace the Soviets wanted.

Furthermore, by the mid-1970's it was becoming obvious that the East Europeans were digging themselves into a hole. Their industrial plant was becoming older, and their engineers and labor force more removed from advances in manufacturing technology. Skipping entire generations of weapons increased the difficulty and initial costs of introducing new systems and thereby appeared to persuade NSWP leaders in many instances to concentrate on other areas of production where the payoff—both through domestic consumption and increased exports—was more immediate. Their inad-

equate attempts to redress the lagging modernization of their defense industries have only compounded the problem. Although in the past decade the East Europeans began upgrading their defense industrial base on a selective basis, NSWP defense industries have generally remained about 10 to 15 years behind their Soviet counterparts. The Soviets began to recognize that as they moved on to produce still newer and more advanced systems, they faced the possibility that the NSWP defense industries would not be able to assume production of the preceding generation of systems and serve as supplier of spare parts as they traditionally have done.

When he came in 1985, Mikhail Gorbachev focused on plans to boost economic growth through massive replacement of outdated plant and equipment in Soviet industry and to raise the technological level of Soviet production. He stressed the importance of Eastern Europe as a supplier of high-technology goods and advanced machinery for Soviet industry and, as a corollary, the need to upgrade the East European industrial base. Gorbachev's emphasis on East European supply of more and better civilian machinery to support the modernization of the Soviet and East European machine-building bases placed unprecedented demands on the East Europeans' machinery and metalworking industries—also the primary source of military hardware and consumer durables.

Given careful planning, however, the East Europeans' dual challenges of expanding their capabilities to produce advanced technology items and of maintaining a viable defense industry could prove complementary. The requirement to produce more sophisticated weapons and equipment and the corresponding need to modernize the defense industries could spur in NSWP industry an authoritative demand for labor- and energy-saving advanced manufacturing technologies that has not existed previously.

In the next decade, the Pact as a whole is facing a period of constrained defense spending and increased emphasis on the civilian sector. Although the Soviets are unlikely to entirely relieve their allies of the task of defense production, they may ease their demands that the NSWP—particularly the two largest producers, Poland and Czechoslovakia—produce steadily more weapons. Bulgaria, which was built an impressive land arms production capability from scratch in little over a decade and has developed a small but credible shipbuilding industry as well—may be used to make up for some of the growth that would otherwise have come from Poland and Czechoslovakia. East Germany is likely to become even more important as a provider of advanced technology components and subcomponents, and the Soviets will likely continue to encourage the growth of its shipbuilding industry. Hungary's role as a provider of advanced technology products is also likely to increase somewhat. Romania, the black sheep of the Pact alliance since the late 1960's, will probably continue to follow its own course in production decisions, at least under the current regime.

THE DISTRIBUTION OF MILITARY EFFORT IN THE WARSAW PACT*

By Daniel N. Nelson**

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SUMMARY

Alliances disperse military efforts among member states. The degree to which military effort is distributed evenly in the Warsaw Treaty Organization is examined in the following essay, with emphasis on two principal dimensions of that effort—the extraction of manpower and material resources, and the performance of military-related activities. These two dimensions of military effort reveal different portraits of the Warsaw Pact, and suggest a complex relationship between the U.S.S.R. and its six East European allies. Further, an exploratory analysis is undertaken to assess possible explanations for variations in WTO members' extractive and performance effort. Preliminary findings suggest a strong role for domestic socioeconomic and political conditions, as well as countries' integration within WTO and CMEA, in accounting for military commitments.

INTRODUCTION

An alliance connotes a dispersion of military effort among sovereign nation-states which have joined together because of real or potential conflict with a common adversary. If there is no such dispersion, then the alliance is a euphemism for the occupation of small, weak states by a large, powerful neighbor or, if not the occupation, then the overwhelming domination of client states by a regional hegemon.

The purpose of dispersing military effort is to enhance the security of all alliance members. Security is the common interest—the

* This contribution is an updated and substantially revised version of a chapter from Daniel N. Nelson, *Alliance Behavior in the Warsaw Pact* (Boulder, CO: Westview Press, 1986).

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“collective good” in Mancur Olson’s terminology¹—provided by the collectivity called an alliance. By sharing military effort, the threat from a common enemy can be met, whereas alone the alliance’s members would be unable to mount credible defenses. Together, alliance members can pool resources, and share—relative to their socioeconomic capacities—the military tasks necessary for collective security.

Of course, the same logic of organizations suggests that alliances will always exhibit unequal contributions to such a collective good. Since an alliance cannot deny its collective good (security) to any member, there is no incentive for small members to expend their own resources if a large member already provides “free” deterrence against the common threat.²

The Warsaw Treaty Organization (WTO, or commonly, Warsaw Pact) is seen by many observers as an instrument of Soviet foreign policy—certainly to ensure domination in Eastern Europe and potentially to enhance aggressive designs in Europe.³ Because of Soviet hegemony, the only “collective good” apparent in the WTO to some analysts is the extension of Soviet imperialism.⁴ Compared to NATO, then, the WTO is certain to be much more unequal—so much so that it may not warrant the nomenclature of an alliance.

Many aggregate indicators buttress those impressions. The U.S.S.R.’s share of WTO military expenditures has probably been close to 85 percent of the Pact’s total,⁵ and some estimates range as high as 90 percent.⁶ By contrast, the United States contributes “about two-thirds” of NATO’s expenditures.⁷ Even when one controls for GNP, the gap between the military expenditures of the U.S.S.R. and East European states over the 1961–85 period was greater than that which separated the United States from its NATO allies. Calculations by Ruth Sivard (which are not necessarily comparable with other data collection efforts regarding Soviet and East European military spending) suggest that the United States averaged 6.5 percent of GNP for military during a 20-year period of 1961–80, while our allies devoted a mean of 3.7 percent of GNP; in the same period, the U.S.S.R. averaged 10.9 percent while other WTO states allocated only 3.0 percent of GNP on average to defense spending.⁸ Other analyses have also indicated a bigger gap between Soviet and non-Soviet spending within the Pact than between U.S. and non-U.S. spending in NATO.⁹

¹ Mancur Olson, *The Logic of Collective Action* (Cambridge, MA: Harvard University Press, 1965); also Mancur Olson and Richard Zeckhauser, “An Economic Theory of Alliances,” *Review of Economics and Statistics* 48 (August 1966).

² Harvey Starr, “A Collective Goods Analysis of the Warsaw Pact After Czechoslovakia,” *International Organizations* 28 (Summer 1974), p. 523.

³ Christopher Jones, *Soviet Influence in Eastern Europe* (New York: Praeger, 1981); Alvin Z. Rubinstein, *Soviet Foreign Policy Since World War II* (Boston: Little Brown, 1985), pp. 102–104.

⁴ Edward N. Luttwak, *The Grand Strategy of the Soviet Union* (New York: St. Martin’s Press, 1983), pp. 77–78.

⁵ Arms Control and Disarmament Agency (ACDA), *World Military Expenditures and Arms Transfers* (Washington, DC: ACDA, 1984), p. 1.

⁶ Ruth Leger Sivard, *World Military and Social Expenditures 1983* (Washington, DC: World Priorities, 1983), p. 7.

⁷ Sivard, *World Military*, p. 7.

⁸ Sivard, *World Military*, p. 7.

⁹ Bruce M. Russett, *What Price Vigilance? The Burdens of National Defense* (New Haven: Yale University Press, 1970). Also Starr, “A Collective Goods Analysis,” p. 531.

But the issue of a country's share in an alliance's total effort (whether manpower, money, or hardware) is misleading. If most alliance members are substantially smaller and inherently less powerful, they might engage in extremely large efforts relative to their socioeconomic or political capacities, and still contribute only a tiny share within an alliance total. These smaller alliance members, however, would be more than upholding their part of the bargain into which states ostensibly enter when joining alliances. Indeed, they will have shared the "burden" of the alliance without contributing a large share of the total alliance military effort.

Such a distinction is important, because it reflects on the purpose and organization of this paper. I do not dispute widely held impressions about the U.S.S.R.'s preeminent place in the WTO, the degree of intra-WTO inequality relative to NATO, or the Soviets' effort to emasculate the national armies of Eastern Europe.¹⁰ Instead, one of my goals is to describe empirically the military efforts of Warsaw Pact members over time, and thereby to portray the role of each state within this principal Soviet-led alliance relative to world standards of defense commitments. If we can derive such an assessment from available data, we will know much more about the extent to which the Soviets do, in fact, dominate their six East European allies. We will also know with greater precision the military preparedness of each East European state.

The value of even this descriptive endeavor may not be apparent when the Warsaw Pact is compared to NATO. After all, the issue of "burden sharing" is highly politicized in NATO. In an organization of sovereign, economically powerful nation-states such as NATO, a considerable effort is mounted by European NATO members to demonstrate their important contributions to the alliance.¹¹ The British calculate, for example, that European NATO members provided the vast bulk of manpower and military hardware to the alliance, "even though Europe's gross domestic product was less than half of the NATO total."¹² This British view appears surprisingly at odds with American calculations of contributions to NATO in large part because it "counts" only American forces in Europe at present as compared with European forces. Indeed, the portrait of NATO offered by other West European governments—for example, West Germany—is often one that diminishes United States' contributions due to the omission of American commitments to, and preparations for, European theater combat.¹³ Conversely, the United States has been ambivalent regarding the West European defense effort, most recently repeating that European allies make "... a substantial contribution to the common difference . . .", while noting that the U.S. "... in some areas is doing more than most of its partners".¹⁴

¹⁰ Jones, *Soviet Influence*.

¹¹ Eurogroup, *Western Defense: The European Role in NATO* (Brussels: Eurogroup Secretariat, 1984 and 1988).

¹² *Survey of Current Affairs*, Vol. 15, No. 6 (New York: British Information Services, June 1985), p. 179.

¹³ See, for example, *The German Contribution To The Common Defense* (Bonn: Press and Information Office of the Federal Republic of Germany, 1986), especially pp. 11-13.

¹⁴ Frank C. Carlucci, Secretary of Defense, *Report on Allied Contributions to the Common Defense* (Washington, DC: Department of Defense, Apr. 8, 1988), p. i.

In part, this politicization arises from a failure to distinguish between military effort and defense burden—which, while intertwined, are analytically distinct. Military effort, which has both extractive (taking human and material resources from a society and economy) and performance (conducting maneuvers, producing arms and exporting them, sending armed forces abroad) dimensions, can involve activities that connote no burden whatsoever. “Burden” necessarily involves costs to the actor—actually uncompensated utilization of resources or opportunity costs (e.g., labor made unavailable, or productive capacity occupied, due to military needs). Sometimes, as well, political costs may mount as unrealized promises yield heightened antagonism from the population. Yet some military effort such as exporting arms can provide substantial benefits, rather than cost, to a nation-state. Further, the extraction of manpower for the military may not mean, entirely, a “burden”; construction, harvesting and other economic roles are fulfilled by the regular military in many countries. To the degree that tradeoffs among alternative and sometimes competing goals are a consequence of military effort, defense burden is created.

I have addressed the specific issue of such socioeconomic political costs elsewhere.¹⁵ Here, however, it is important to underscore this conceptual difference, often omitted when considering the dispersion of military effort within alliances.

There is no such politicized counterpoint within the Warsaw Pact, of course. Aside from Romanian pronouncements which have diverged from WTO norms throughout most of the past two and a half decades, the U.S.S.R. has set the tone by which East European governments refer to their contributions to the alliance. But the question of relative contributions to military activities of the Warsaw Pact is not moot. A system such as the German Democratic Republic may be most “reliable” among East European allies of the U.S.S.R. were hostilities to occur in Central Europe.¹⁶ It is, however, quite another matter to gauge how the day-to-day maintenance of the alliance, and performance of military activities which arise because of it, are distributed.

From a theoretical perspective the questions are much broader. Once one describes the degree to which military effort is dispersed within the Warsaw Pact, an explanation for variation across countries and over time must be sought. How can we best explain the distribution of military effort among members of the Warsaw Pact? This paper thus has two goals—to describe how defense commitments vary in the Warsaw Pact and to examine alternative explanations for differences and changes in military efforts.

MEASURING MILITARY EFFORT IN THE WTO: EXTRACTIVE INDICATORS

No universal definition of military effort exists. In studies of the Warsaw Pact, for example, operational definitions are often omit-

¹⁵ See Daniel N. Nelson, “The Political Economy of Warsaw Pact Defense Expenditures,” in Keith Hartley and Todd Sandler, eds., *The Economic Consequences of Defense Expenditures in Comparative Perspective* (London Routledge, forthcoming 1989).

¹⁶ Daniel N. Nelson, “The Measurement of East European WTO ‘Reliability,’” in Daniel N. Nelson, ed., *Soviet Allies: The Warsaw Pact and The Issue of Reliability* (Boulder, CO.: Westview, 1984), p. 37.

ted, and military effort is used interchangeably with defense burden.¹⁷

One can, however, simplify the problem of gauging defense commitments by reasoning that "military effort" exists when resources are *taken*, or tasks and duties are *performed*. In either direction, effort is effected. The extraction of human and material resources from a country per year must be components of "military effort."¹⁸ In studies of burden-sharing for NATO states, this extractive commitment has been referred to as "input" (the amount of resources a country devotes to defense).¹⁹ Performance effort, however, is a new concept.

The problems of operationalizing the extractive dimension of military effort are considerable. Discussions in the literature of arms control and military studies about measuring Soviet and East European defense expenditures, and East-West comparisons of such data, are voluminous and have led to several different and competing estimation techniques (used by the CIA, ACDA, IISS, SIPRI, etc.). Nevertheless, within-WTO comparisons present in some ways less imposing obstacles than within-NATO comparisons. The use of expenditure data to gauge NATO members' contributions to the alliance runs into the great diversity of budgetary and tax systems among North American and West European states. Merely to decide what constitutes "defense expenditures" has created an insurmountable tangle for NATO headquarters. And, since Western currencies fluctuate in value relative to each other on a daily basis, the strength of the dollar vis-a-vis other currencies can alter greatly the estimates of comparative defense effort.

In the Warsaw Pact, greater uniformity prevails regarding the treatment of military expenditures and, since they are not convertible, currencies retain an official stability relative to each other. That weapons systems tend to be identical, and that most new weapons designs originate in the U.S.S.R., also enhances comparability of expenditure data; Pact forces will be buying and maintaining identical weapons (except for the most advanced technologies confined to Soviet forces). Provided that comparisons are made within the Warsaw Pact only, such factors can simplify our operationalization of military effort.

Military service is also an important indicator of the extractive dimension. Once again, the diversity of NATO (some members having entirely volunteer forces, some requiring universal conscription) is not present in the Warsaw Pact; all WTO states have conscription and fill out the ranks of their military forces with conscripts in all branches.

In the following analysis, therefore, expenditure and manpower data for Warsaw Pact members will be compared over time as indi-

¹⁷ See, for example, Condoleezza Rice, "Defense Burden-Sharing," in David Holloway and Jane Sharp, eds., *The Warsaw Pact: Alliance in Transition* (Ithaca: Cornell University Press, 1984). I have, as well, failed to make what I now regard as an important conceptual distinction in an earlier version of this essay in my book *Alliance Behavior in the Warsaw Pact* (Boulder, CO: Westview Press, 1986).

¹⁸ For a discussion on how states extract resources from their populations see A.F.K. Organski and Jacek Kugler, "Davids and Goliaths: Predicting the Outcomes of International Wars," *Comparative Political Studies* 11 (July 1978); as well as A.F.K. Organski et al., *Births, Deaths, and Taxes: The Demographic and Political Transitions* (Chicago: University of Chicago Press, 1984).

¹⁹ Simon Lunn, *Burden-Sharing in NATO* (London: Routledge and Kegan Paul, 1983).

cators of extractive effort. Military expenditures as a proportion of gross national product (MilExp/GNP) is a useful indicator insofar as it gauges resources spent on defense relative to a measure of a country's wealth. Military expenditures as a proportion of central government expenditures (MilExp/CGE) is employed here as a second indicator since extractive burden must tap the relative importance of military spending as compared with everything spent by a national government. It is plausible that a central government might allocate a very large part of its budget to the military, but that same amount would constitute a small fraction of GNP. Hence, both measures are needed. Finally, a third indicator will be military manpower standardized per 1,000 population, itself a vital indication of personnel taken from the civilian economy and supported by the defense budget.

From these three indicators I have sought to create, in essence, an index of extractive effort. To do so, of course, requires some transformation of raw data since the "apples" of expenditure data cannot be added to the "oranges" of military personnel per 1,000. Since my goal is first to describe relative defense commitments, raw data on indicators of extractive effort must be standardized. Expressing military effort relative to worldwide standards provides, I think, the most easily understandable index for such measures.

All three indicators of extractive burden are drawn from the United States Arms Control and Disarmament Agency's (ACDA) annual report on *World Military Expenditures and Arms Transfers, 1987*.²⁰ While this source overstates military expenditures of communist systems as compared with other sources, the longitudinal consistency and variety of data in this one source make a compelling case for its use.

Data for seven members of the Warsaw Pact on these three indicators are reported in the following analysis on the basis of a simple procedure which converts actual levels cited by ACDA to a 0-10 scale for each indicator. The ACDA collection reports data for virtually all nation-states. The distribution of all nation-states on the three extractive indicators, and the calculation of "world means" for all three, suggests a 0-10 scale with a score of "5" representing the range of actual expenditures or military personnel in which the world mean exists.

Thus, in 1985, Bulgaria allocated 8.0 percent of its GNP to military expenditures, 18.5 percent of CGE to the military, and had 19.8 percent personnel in uniform per 1,000 of population. These actual data were scored, respectively, 9, 5, and 9. One should interpret these scores to mean that, relative to all nation-states, Bulgaria was well above the mean in terms of MilExp/GNP and military per 1,000 population, and near the world mean (which was 20.7 in 1985) for MilExp/CGE. For 1985, then, Bulgaria had a total score on the three indicators (where each was scored on the 0-10 scale) of 23 out of a possible 30; expressed as a proportion, Bulgaria's Cumulative Extractive Effort (CEE) in 1985 was 0.77.

Accuracy is lost, of course, by converting precise statistics to 0-10 scores—a step necessary for the creation of an index involving

²⁰ ACDA, *World Military Expenditures and Arms Transfers* (Washington, DC, ACDA, 1987).

three very different indicators. Nevertheless, the procedure described above does not do injustice to ordinal distinctions among the cases being studied (here, the seven WTO members).

MEASURING MILITARY EFFORT IN THE WTO: PERFORMANCE INDICATORS

Defense commitment is seen only partially through data on extractive effort. The tasks assigned to, and performed by, a country's defense infrastructure must be an element of any calculation of overall defense effort. Small countries, with relatively insignificant armed forces and expenditures, might nevertheless be utilized through bilateral agreements or an alliance, as proxies for the dominant power. An extreme example of this point is Cuba; although outside the Warsaw Pact, the range and extent of Cuban military performance far exceeds what could ever be extracted from the Cuban society and economy alone. Relative to world standards, such a small state can and does undertake enormous "performance effort."

Within the Warsaw Pact, or any alliance for that matter, we need to be attentive to variations in performance effort. The entire character of an alliance can change with heightened performance effort insofar as small allies with limited extractive commitments (except in terms of military manpower per 1,000 population) are surrogates for the dominant alliance partner. Put simply, the small members of an alliance become quasi-mercenaries; their entry into other activities or regions of the world is a consequence not of their own interests but instead the much wider involvement of a major power.

Extractive and performance effort, then, may not be closely related. The degree to which they (the two dimensions of a country's commitment to defense) are *not* associated with one another might be a good empirical indicator of asymmetry within an alliance. From the standpoint of Western foreign and defense policies, it is also vital to know how such an organization as the Warsaw Pact is changing over time in terms of the military tasks fulfilled by East European members, particularly as a widened framework for conventional negotiations—Conventional Forces in Europe talks (CFE)—looms ahead.

Measurement of performance effort is attempted here through the use of three indicators: (1) arms exports as a proportion of all exports, over the 1975–85 period; (2) the total number of alliance (WTO) military exercises in which a country's forces participated plus the number of times a country served as the site for an exercise, per year, from 1975–85; and (3) active duty military personnel abroad per 1,000 population from 1975–85.

The first of these indicators, arms exports as a proportion of all exports, requires further explication. In an alliance such as NATO, selling armaments is a beneficial economic activity to a number of the alliance's members; competitive designs from West European and North American manufacturers seek larger shares of the world's arms market. Such an observation may lead one to conclude that arms exports do not tap the concept of performance effort. Even in NATO, however, it is fair to say that purchasers of

arms and military technology are predominantly from the same group of states; with few exceptions, NATO members do not sell arms to each others' enemies.²¹ For the Warsaw Pact, arms sales are to a much narrower list of customers, almost all clients of the U.S.S.R., and designs generally are not competitive. And, of course, armament industries are state owned such that production and sales decisions are entirely a function of policy established by the party elite. Taken together, these factors suggest that arms exports as a proportion of all exports can help gauge a WTO member's economic "militarization" and mission with the WTO as an arms producer.

In the case of arms exports, ACDA data provided relatively exact measures, and thus the placement of Warsaw Pact countries on that indicator can be seen as incorporating greater accuracy. Joint exercise participation and site tabulations, taken from Jeffrey Simon through 1982, and updated by the author,²² did not involve conversion to a 1-10 scale and therefore incorporated no reference to world standards. Instead, the actual number of joint exercises in which a country participated was added to the number of times exercises were conducted on its soil, and this total was divided by the number of times Soviet forces were involved in joint maneuvers. The resulting proportion suggests effort on that indicator relative to the U.S.S.R. One reason for dispensing with "worldwide" standards for this indicator is that, except for NATO, no multinational alliances of comparable size exist in the world. Likewise, one cannot utilize a worldwide standard for military forces abroad because the median would be zero; most nation-states have no forces outside their own country. Thus, scores given to WTO members on the 0-10 point scale used for military forces abroad per 1,000 population are relative only to the estimated 30 countries which, in 1985, had elements of their active-duty military and military technicians abroad.

EXTRACTIVE EFFORT

Some of the country-specific findings which emerge from measures of extractive effort are unequivocal and entirely expected. That the U.S.S.R., relative to all the world's nation-states, maintains extremely high levels of defense commitments is dramatic. Bulgaria's extractive effort is near the top for all nation-states as well, mirroring the obedience to Moscow often attributed to that Balkan regime. Generally high levels of military personnel per 1,000 population also characterize other WTO members. (See Table 1.)

²¹ International Institute of Strategic Studies (IISS), *The Military Balance, 1985-86 and 1986-87* (London: IISS, 1985 and 1986), pp. 174-177 and 209-211, respectively.

²² Jeffrey Simon, *Warsaw Pact Forces* (Boulder: Westview, 1985), pp. 222-228. Reports of Joint exercises (participants and sites) for 1983-85 were tabulated by the author from dispatches and reports contained in Foreign Broadcast Information Service, *Daily Report, Soviet Union*, and *Daily Report, East Europe*. Because of the Stockholm Document signed in 1986, indicating a total of nine "notifiable" joint WTO maneuvers in 1987 (see SIPRI, 1987, pp. 372-379)—perhaps representing a slight decline in ground forces training corresponding to an overall cutback in Soviet military activity.

TABLE 1.—EXTRACTIVE EFFORT AMONG WTO STATES, 1975-85

| | Mean effort MilExp/GNP, 1975-85 | Mean effort MilExp/CGE, 1975-85 | Mean effort forces/1,000, 1975-85 | Mean cumulative extractive effort (CEE), 1975-85 |
|---|---------------------------------------|---------------------------------------|---|--|
| U.S.S.R. | 0.90 | 100.00 | 0.90 | 0.94 |
| Bulgaria | .69 | .53 | .93 | .72 |
| Czechoslovakia | .50 | .50 | .80 | .60 |
| Poland | .52 | .51 | .75 | .59 |
| East Germany | .54 | .40 | .80 | .58 |
| Romania | .50 | .44 | .66 | .53 |
| Hungary | .49 | .30 | .64 | .48 |
| WTO means for each indicator with U.S.S.R. | .59 | .54 | .78 | 1.63 |
| Without U.S.S.R. | .56 | .46 | .77 | .60 |

¹ WTO means CEE 1975-85.

Source: All calculations by author based on ACDA data, 1975-85.

But individual nuances are worthy of mention insofar as the WTO's extractive efforts, measured relative to world standards from 1975-85, do not follow expected patterns.

The U.S.S.R., for example, continued to expand strategic weaponry, naval power, etc., but did not raise its relative defense commitments above the few other states which exceed the U.S.S.R.'s effort. Of course, the Soviets (one might argue) did not need to engage in the mobilization efforts of Israel or Iraq, nations constantly engaged in combat operations or at war. But the Soviets may have, by the mid-1980's, reached or exceeded the limit of their defense endeavors where more investment in the military so weakens the entire economy that the military is adversely affected.

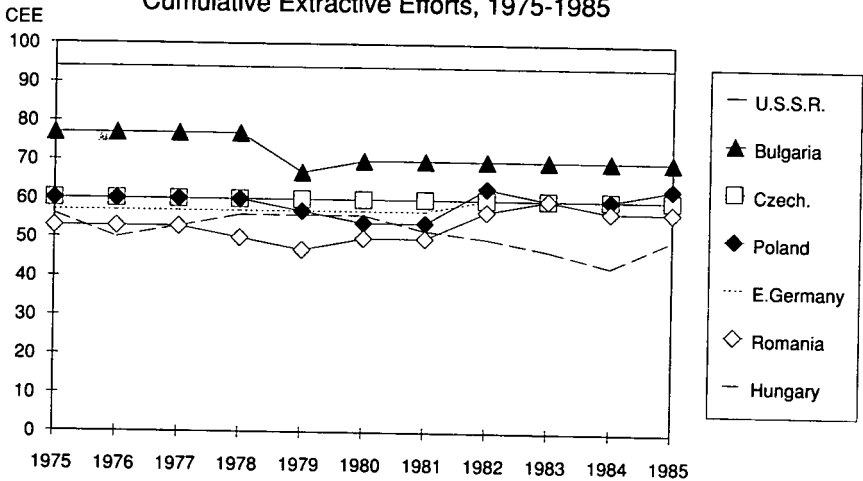
Whatever the Soviet's rationale, their relative "standing" in terms of extractive effort was about constant in the 1975-85 period. Interestingly, the degree to which the U.S.S.R. exceeded its allies in terms of expenditures (MilExp/GNP and MilExp/CGE) was larger than with respect to force levels. The difference is not substantial, but could reflect one of several important situations. Such a difference could be a reflection of the collective goods theory applied to alliances; large members provide bigger shares of the collective goods "free" to smaller members, incurring higher expenditure to force ratios. A more simple explanation is that a superpower is less cost efficient in military management; per dollar (ruble), the U.S.S.R. "buys" fewer troops than its smaller allies. That, in turn, might reflect a high-tech, costly Soviet military versus low-technology militaries of some Soviet allies. These latter arguments, however, do not seem as persuasive as the first. Certainly, maintaining an alliance and financing the global involvement in which the U.S.S.R. became engaged in the 1970's and 1980's have meant more costs above and beyond military manpower. The less active and more geographically confined a nation's military forces, the higher force levels will be relative to expenditures.

Bulgaria, of all Soviet allies in Europe, "takes" the most from its society and economy for its military. Means on each of these three indicators for Bulgaria are high, but particularly for forces/1,000 and MilExp/GNP. (See Table 1.) When plotted over the 1975-85 period, moreover, Bulgaria is closest to Soviet levels in "Cumula-

tive Extractive Effort" (CEE), the mean of the three indicators. (See Figure 1.)

Figure 1

Comparative Defense Efforts of WTO States:
Cumulative Extractive Efforts, 1975-1985



Czechoslovakia, Poland, and East Germany all have high force levels, a reflection of their centrality in WTO planning. All have lower MilExp/CGE, and Poland's overall CEE declined during the economic and political crises of 1979-81.

Romania and Hungary exhibit the lowest CEE's, with Romania's dipping to a low point in 1979 and then climbing, perhaps in response to the military's demands and/or socioeconomic tensions accumulating in Ceausescu's Romania raising the perceived need for loyal armed forces. Hungary, meanwhile, had a relatively low extractive burden by the 1980's, and probably can be regarded as the least "militarized" system in Eastern Europe.

Comparisons among WTO members, and between the U.S.S.R. and East European states, reveal a number of patterns in extractive effort that warrant our attention. Cumulative Extractive Effort for all Pact members suggests a high degree of militarization relative to world standards. Taken collectively, the expenditure and manpower indicators used here imply a consistently high level of extractive commitments throughout 1975-85—not surprising at all to observers of Soviet and East European militaries. But these data also suggest that, far from increasing their extractive burdens compared to worldwide levels, WTO members have generally maintained their relative placement.

It is also apparent that a slight lapse in extractive effort took place for the alliance as a whole in the late 1970's to early 1980's. Between two 11-year groupings, 1972-82 and 1975-85, the Pact's aggregate CEE declined from 0.65 to 0.63, coincident with the severe economic slump which affected the entirety of Eastern Europe, resulting in plummeting growth rates, rapidly increasing foreign

debt, and other negative trends. Poland's sociopolitical crises also played a role in this overall alliance decline in extractive commitment.

One should point out here that this slight diminution of WTO's CEE occurred as superpower tensions increased in the late 1970's and early 1980's. At first glance, then, one is led to doubt that Warsaw Pact members "take" more resources from their economies and societies when there is heightened tension between the United States and the Soviet Union.

Components of extractive effort are not distributed evenly within the Pact. As noted earlier, manpower levels are greater relative to world standards than are military expenditures except in the Soviet case. Only Bulgaria approaches the U.S.S.R.'s level of expenditure effort (MilExp/GNP). The Pact, including the U.S.S.R., appears statistically to be making a more substantial budgetary effort than when Soviet data are excluded. The mean force level per 1,000 population, however, is about the same whether or not Soviet data are included in the calculation (0.78 versus 0.77).

The Warsaw Pact, in other words, denotes an organization of states with well-above average resource commitments to defense. The East European "contribution" to the WTO is particularly significant in manpower terms, and less (except for Bulgaria) in a budgetary sense. Indeed, Eastern Europe as distinct from the U.S.S.R. does not have high expenditures for defense relative to world standards. This says nothing about how prepared or reliable their forces may be, of course, since many military tasks would not require a high cost per effective (i.e., per soldier) ratio. Yet, aside from Bulgaria, these Soviet allies extract far less of their wealth for military expenditures than does the U.S.S.R.; their extractive effort, relative to world standards, appears to emphasize manpower rather than money.

Why is extractive effort distributed in this way? What explains variation across countries and over time? The most simple and satisfying explanation might be to attribute all variation in defense effort within the WTO to decisions made in the Kremlin. Expenditure and manpower contributions by Warsaw Pact members, then, would be a matter of Soviet policy.

There is no evidence to support such an all-inclusive explanation. It makes no sense that the U.S.S.R. would desire, or even voluntarily authorize, cutbacks in relative extractive commitments among its allies in the late 1970's when confrontation with the United States was rising and Soviet worldwide involvement was expanding. It makes no sense that a WTO or Western TVD (Theater of Military Operations) commander, then Kulikov, would accept willingly the very low effort made by Hungary in military expenditures.

Instead, it is evident that the Warsaw Pact is a much more complex entity. The Soviet Union's interests, while important, do not account for the variations in extractive effort across countries or over time. Domestic socioeconomic and political conditions appear likely to play equal roles in determining the commitment of resources and manpower to defense. Hungarian priorities, for example, are certainly elsewhere, and the WTO is not high on the list for the Hungarian population or the Hungarian Socialist Workers'

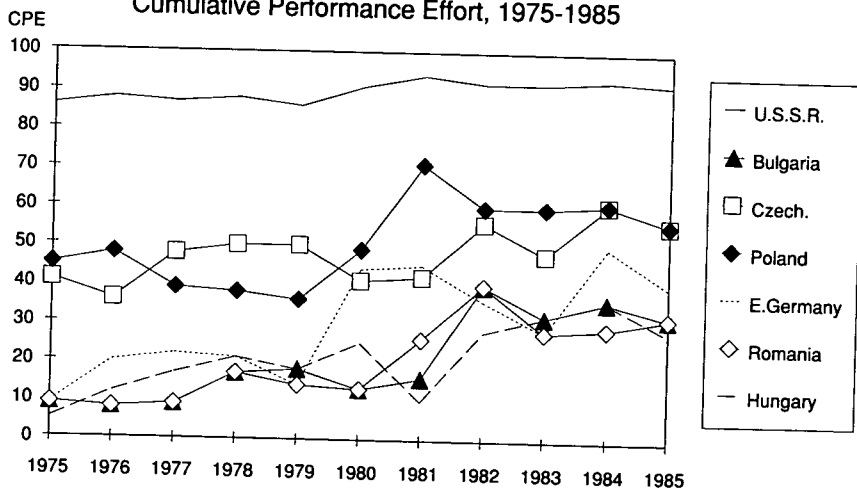
Party regime. In Poland, there was a need for the military as the Polish United Workers' Party ceased to rule effectively, but the need had little to do with the heavy armor and supersonic interceptor aircraft meant for WTO operations.

Military effort, while partially measured through data about resources extracted from a country's economy and society, must also be seen from the perspective of military tasks performed by a nation-state.

PERFORMANCE EFFORT

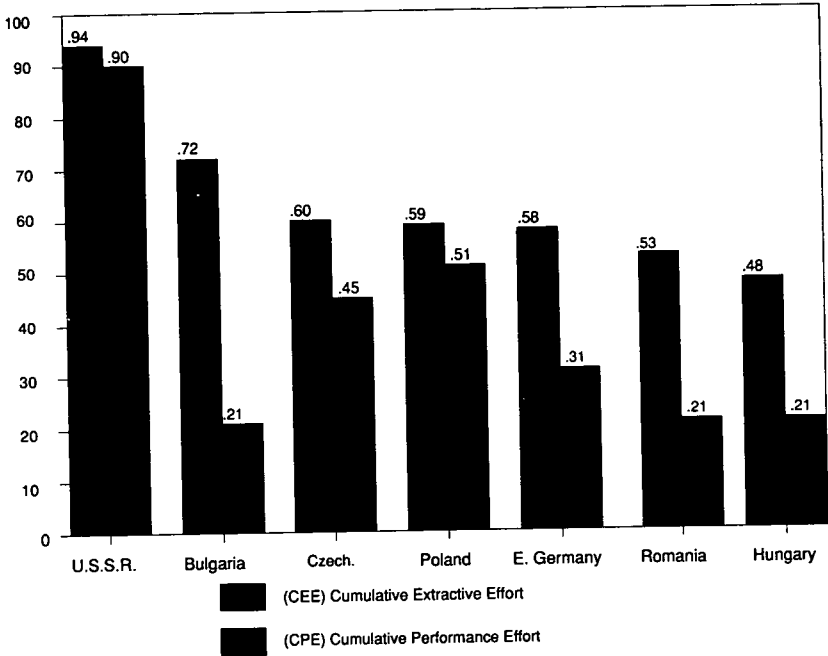
The Warsaw Pact does not, in many ways, look like the same alliance when data about military activities of member states are examined. The three indicators used to gauge this component of military effort were selected because of the different dimensions in which defense tasks can burden a system—militarizing the domestic economy for weapons production, staging or participating in training exercises, and sending military personnel abroad (to train other nations' forces, to construct or maintain facilities, and as with Soviets in Afghanistan, to engage in combat). Such data portray the WTO in a much different light than do indicators of extractive effort. Military tasks do not have the same pattern of distribution in the WTO as do extractive commitments, and the Pact as a whole has varied more in performance effort over time. (See Figure 2.)

Figure 2
Comparative Defense Efforts of WTO States:
Cumulative Performance Effort, 1975-1985



And, when Warsaw Pact states are compared to one another on both dimensions of defense effort, the different distributions of extractive and performance dimensions from 1975-85 are apparent. (See Figure 3.)

Figure 3
 Cumulative WTO Extractive and Performance Efforts
 by Country, 1975-1985



The Soviet Union, to be sure, earns its image as a system heavily weighed down by military activities. The U.S.S.R. exceeds virtually all other states in arms exports and military training, and trails (in the mid-1980's) only Syria, Morocco, Vietnam, Cuba, and Israel in military personnel abroad (active military personnel abroad per 1,000 population).

But performance effort is dispersed in a manner quite different than the extractive dimension. Bulgaria's very considerable extractive effort does not mean that it assumes a proportionately large number of military tasks. Bulgaria exports few arms, maneuvers infrequently with allies, and has only a small part of its active military personnel abroad.

The Northern Tier countries, by contrast, exhibit performance levels which are much more substantial. This is not to say, of course, that their extractive efforts are "light" but that the Northern Tier states (East Germany, Poland, and Czechoslovakia) assume tasks within and outside Eastern Europe much more than do Southern Tier countries (Hungary, Romania, and Bulgaria). This is logical, of course, since NATO-WTO combat is usually thought to be most likely (or that combat would be most decisive) in the North German Plain and Fulda Gap. Consequently, the WTO devotes more attention to training and equipping forces in that sector opposite NATO's greatest strength.

For both Northern and Southern Tiers, however, extractive efforts are not strong predictors of performance efforts (or vice versa). Statistically, the relationship between the two elements of defense effort within the Warsaw Pact is moderate when the U.S.S.R. is included and weak when the U.S.S.R. is excluded (Spearman's Rho, respectively, 0.48 and 0.21).

In the Northern Tier, Czechoslovak performance effort is concentrated in arms exports, in which the Czechoslovaks have an historical expertise. Rice has discussed the arms production of Czechoslovakia and Northern Tier states more fully.²³ Czechoslovakia also shares, with other Northern Tier states, more frequent participation, and as a site for, maneuvers. (See Table 2.)

TABLE 2.—MEAN PERFORMANCE EFFORT AMONG WTO STATES

| | Mean effort arms exports/total exports, 1975-85 | Mean effort Mil Exercises (as propor. of Soviet), 1975-85 | Mean effort MilPers abroad/population, 1975-85 | Mean cumulative performance effort (CPE), 1975-85 |
|--|---|---|--|---|
| U.S.S.R..... | 1.00 | 1.00 | 0.75 | 0.90 |
| Bulgaria..... | .36 | .13 | .10 | .21 |
| Czechoslovakia..... | .71 | .53 | .15 | .45 |
| Poland..... | .75 | .79 | .13 | .51 |
| East Germany..... | .22 | .60 | .25 | .31 |
| Romania..... | .42 | .10 | .05 | .21 |
| Hungary..... | .22 | .45 | .07 | .21 |
| WTO means for each indicator with U.S.S.R..... | .53 | .51 | .21 | .40 |
| Without U.S.S.R..... | .45 | .43 | .13 | .32 |

¹ WTO mean CPE 1975-85.

Source: All calculations by author. Arms export data based on ACDA, 1987. Military exercises calculated using Jeffrey Simon, Warsaw Pact Forces (Boulder: Westview, 1985) for 1975 through 1982. Updating (1983-85) by author using FBIS Daily Reports, Soviet Union and Eastern Europe, Forces abroad/population calculated by author using estimates from Ruth Sivard, World Social and Military Expenditures (Washington, DC: World Priorities, various years) and CIA Handbook of Economic Statistics (Washington, DC, various years), data on "military technicians from communist states" in Third World.

Poland, which is only somewhat less than Czechoslovakia involved as an arms exporter, is frequently engaged in large-scale exercises and to a modest degree is involved in training Third World militaries and building their facilities. The East Germans specialize, as it were, in security forces and paramilitary training abroad. Estimates vary widely regarding precise numbers of East Germans engaged in such activities. Here, an estimate for 1985 of approximately 3,000 is used because of the desire to incorporate both armed forces personnel and "technicians" engaged in military projects.

Among Southern Tier cases, Bulgaria's military presence abroad is slightly more extensive than Romania and Hungary in the late 1980's, largely because of higher arms sales that require supporting technicians. Romania's recent (beginning in 1981) entry as a sizable exporter of arms made it, in terms of relative effort (as a proportion of all exports) almost equal to Polish and Czechoslovak efforts for a couple years (1981 and 1982 more than \$500 million in constant dollars). Among these countries which export arms, Romania is not one of the world's leaders, but the Ceausescu regime may see this as a way to create a dependable market for something of Ro-

²³ See Condoleezza Rice, "Defense Burden-Sharing."

manian industrial origin. The largest part of Hungary's performance effort is the frequency of maneuvers with Soviet troops, while it remains a minimal arms exporter and is not known to have many military personnel abroad.

Such a country-by-country summary points to a kind of specialization among WTO East European members and to the Northern Tier's heavier performance commitments. For the alliance as a whole, the performance dimension has varied significantly over time. At the height of détente—arguably between 1973-75—performance effort declined.²⁴ From 1980-82, Cumulative Performance Effort (CPE) rose sharply in the Warsaw Pact, an increase that was related to the Polish crisis and to the expansion of Soviet military power and involvement around the world. And, as the performance dimension of military effort increased in 1980-82, the alliance became more cohesive in one important respect—that is, the alliance Cumulative Performance Effort including the U.S.S.R. was less different from the alliance CPE excluding Soviet data than at any time in the 1975-85 period.

Thus, the Warsaw Pact appears to be responsive in its military performance to crises within the alliance and to Soviet-defined international interests. In its Northern Tier, the Warsaw Pact is an alliance with performance burdens dispersed via a de facto "specialization" of roles.

EXPLANATIONS FOR MILITARY EFFORT IN THE WARSAW PACT: SOME PRELIMINARY CONSIDERATIONS

Several plausible explanations for differences and trends in defense effort merit discussion notwithstanding the data limitations within which such an examination must be conducted. Extractive and performance effort might be expected to be affected by East-West tensions. The principal Soviet-led alliance may "react" in some tangible way to fluctuations in the proportion of encounters between its members and the West that could be characterized as cooperative vis-a-vis confrontational. A period of détente, one might expect, would be coincident with reduced defense commitments—that is, as the interaction between Warsaw Pact and NATO states becomes more cooperative, both dimensions of military effort by the WTO alliance will decrease.

In an earlier study, I employed the World Events Interaction Survey (WEIS) data set in which interactions between NATO and the WTO were coded on a scale according to the degree of conflict present in each event. The WEIS data, unfortunately, include only the period through 1978. Using events coded as "cooperative" from 1972-78, Spearman's rank-order correlations were calculated between this indicator of international cooperation and both extractive and performance effort for those years—i.e., including a period several years prior to the descriptive data outlined above. For both dimensions of military effort, separate calculations were made for the WTO with, and without, the U.S.S.R.

²⁴ See an earlier version of this article in Daniel N. Nelson, *Alliance Behavior in the Warsaw Pact* (Boulder: Westview, 1986).

Between "cooperative events" and extractive effort, I did *not* find evidence that East and West cooperation was associated with lower military expenditures and manpower levels. When interactions between the West and the Soviet Union are included, the association between cooperative events and extractive effort was positive (0.43) in the 1972-78 period. During these 7 years, spanning both a time commonly assumed to be part of détente as well as several years when tensions were again mounting, higher levels of East-West cooperation tended to occur as somewhat higher extractive effort was undertaken. For Eastern Europe alone, the association was stronger—a positive 0.60. Given the imprecision of these measures, however, it is wise to say no more than the direction of these relationships was "wrong"—or, at least, wrong from Western expectations. The Soviets, however, never implied that détente meant reduced attention to military procurements; the Warsaw Pact continued to maintain its levels of military effort along the extractive dimension quite apart from fluctuations in "cooperative events" with the West.

Performance effort and the WEIS measure of East-West cooperation, however, were negatively related from 1972 through 1978 (−0.44, both with and without the U.S.S.R.). As cooperative events declined, performance effort increased, and vice versa. This was not a strong relationship, however, and one cannot rely on this indicator of East-West tension alone to explain performance effort. But the WTO became a less "active" military alliance during the period of détente.

Subsequent events during the Reagan Presidency provide a further "real-world" test of these relationships found in the prior decade. In Figure 1 and Figure 2, it is clear that heightened superpower tensions of the early 1980's did not mean a substantial change in extractive patterns. There were, however, elevated levels of arms exports and joint military training that began coincident with the Polish crisis of 1980-82, and continued thereafter. In the Northern Tier and Bulgaria—the alliance's core East European members—and the U.S.S.R., such a pattern may suggest that the WTO responds in its performance to short-term changes in the international environment, but proceeds resolutely on a longer term extractive program.

States' integration within the WTO—largely meaning a dependence on the U.S.S.R.—may also affect military effort. Several indicators over the 1975-85 period were used to examine this expectation. The rankings of WTO members on systemic integration were derived from three indicators—"force mobility," the ratio of Soviet troops to indigenous troops, and CMEA trade dependency. The latter two measures are neither complex nor fluctuating. Although Soviet withdrawals announced by Gorbachev in December 1988 have now begun, the number of Soviet troops in East European countries relative to their own total armed forces has been quite stable since 1968. (East Germany first, of course, with a ratio of more than 2:1 and Romania last since no Soviet troops are stationed there in any capacity.) WTO members' ranks on the proportion of their total imports and exports that are confined within the Council for Mutual Economic Assistance have also been rather stable; while a case such as Poland has shown a modest "reintegra-

tion" in the 1980's, relative placement among WTO members has not fluctuated.

"Force mobility," however, is less self-explanatory. One element of system integration is certain to be the military role played by WTO members in the alliance. I wanted to tap that quality as part of this indicator, yet not overlap with the notion of performance effort. Moreover, the core of any systemic integration measure must not be a particular nation-state's military activity (i.e., performance effort), per se, since that dimension of military effort may be entirely disassociated with an alliance, but rather how that activity is "integrated" within the context of the alliance. The frequency of maneuvers with other alliance members, and the number of times a country was a site for such maneuvers, are incorporated in performance effort; these tell about effort from the standpoint of activity only. Czechoslovakia, for example, was very often a participant in, and site for, exercises. One reason for that activity is clear: Czechoslovakia is in an important location, and the Pact must prepare for combat in and from Czechoslovak territory. But Czechoslovak forces rarely left Czech territory, while their neighbors, the East Germans, were often maneuvering with WTO forces elsewhere. Such "force mobility"—the difference between the proportion of all known WTO maneuvers in which a country's forces participated and the proportion of all known WTO maneuvers that were held in that country—implies the Soviets' views about the utility of another state's forces within the alliance.

An index of political conditions meant to tap the political control exercised by communist parties in particular cases is derived from a country's ranks (relative to WTO members) on (1) political violence events, (2) proportion of population in the party, and (3) proportion of the officer corps in the party. For the purposes of this analysis, economic conditions refer to a net economic trend measured by GNP per capita as a proportion of the Soviet GNP per capita. The biggest gains relative to the U.S.S.R. in GNP/capita from 1975-85 are thus expected to be positively associated with higher military effort. Conversely, states with deteriorating economic conditions relative to the U.S.S.R. during this period might be those in which one would see less military effort.

Preliminary tests of such hypotheses were effected by calculating Spearman's rank-order coefficients between extractive burden or performance effort and the three indexes for the six East European members of the WTO.²⁵

These findings suggest that economic conditions, relative to the Soviet Union's, are related negatively to both dimensions of military effort. This measure of economic conditions was meant to gauge the relative performance of a state's economy vis-a-vis the U.S.S.R.; of course, populations of Eastern Europe do not necessarily look East for their comparisons. As a standard of performance within the "system" of Communist Europe, however, the Soviet Union's changing GNP/capita from 1975-85 provides a comparative base. This negative relationship implies that better economic

²⁵Tests and statistical results using 1972-82 data were reported fully in Daniel N. Nelson, *Alliance Behavior in the Warsaw Pact*, pp. 71-107. For this revised study, recalculations using 1975-85 data were completed and findings are discussed herein.

performance relative to the U.S.S.R. tends to be associated with lower extractive effort (Spearmans $Rho=0.32$).

The negative relationship between performance effort and net economic trend is also evident. As economic trends become worse, relative to the U.S.S.R., the performance dimension is likely to rise. It may be, of course, that economic conditions are enhanced by lower extractive military commitments. A negative coefficient for performance effort, however, is less understandable. Presumably, arms exports (one element of performance effort) would be a marginal boost to an economy. Maneuvers are, however, costly and disruptive, and sending military personnel abroad (even a few hundred) is likewise an expensive proposition even when transportation is "provided" by the Soviets. These direct "costs" of military activities do not alone yield less positive economic trends. Instead, a higher performance effort is likely to be related to political turmoil, including domestic unrest, that will also mitigate economic health.

Indeed, when political conditions deteriorate, performance effort appears to rise. As one might surmise, in situations where the ruling party is less secure from the standpoint of civil unrest or party penetration of society and the military, performance effort is higher. This relationship was most evident during 1980-81 as the Soviet Union and other WTO allies maneuvered frequently together. The positive relationship between political conditions and extractive effort is also consistent with prior suspicions. Greater political security of East European regimes tends, to a modest degree, to be associated with higher capacities and/or willingness to make long-term commitments of human and material resources to armed forces.

Greater systemic integration is, to be sure, important for explaining both higher levels of extractive and performance effort, but the relationships are perhaps not as strong as one might have expected. Were the Soviet Union as dominant in Eastern Europe as is often portrayed, we might expect to see very integrated states (until the onset of the Gorbachev era in 1985, East Germany would qualify as "most integrated") ranking much higher on extractive and performance effort than less integrated states. Yet, the relationships are not so clear. Poland and Bulgaria were somewhat "less integrated" during the 1975-85 period than was East Germany due largely to military factors, but Poland ranked first on performance effort while Bulgaria was first on extractive effort among non-Soviet WTO members. Obviously, domestic economic and political conditions must be added to reach any satisfactory explanation of variation in the two dimensions of military commitment.

Such a broad explanation is beyond the scope of this preliminary analysis. To derive anything resembling a predictive model from these tenuous measurements is a risky venture. But, for future analyses, it seems useful to suggest the environments in which defense effort in the Warsaw Pact might be maximized and minimized.

In the WTO, performance effort was associated negatively with cooperative interactions between East and West (it tends to decrease when cooperative interactions are proportionately greater) in 1972-78, and appears to have retained that tendency in the

1980's. Performance effort has been negatively associated with economic and political conditions (it increases when economic trends worsen and political stability diminishes) in the 1970's and 1980's. Military activities are, however, positively related with systemic integration. In the Northern Tier, one finds the "most integrated" members of the WTO. Were such more integrated states as East Germany, Poland, and Czechoslovakia to undergo periods of popular unrest and economic malaise, coincident with a time of East-West tension, their performance effort would almost certainly be maximized. And, as implied earlier in the descriptive section, the gap between East Europe and the U.S.S.R. would diminish under such conditions. Poland during the 1980-82 period was a case in point—wherein all of the principal elements were present that heighten commitment to military performance. For a while, Poland's "share" of the Warsaw Pact's effort increased substantially because of the confluence of these factors.

The association between popular disaffection, as a component of political conditions, and performance effort deserves more attention than can be given here. Many scholars have speculated about the role of the WTO as a counterweight to political currents in Eastern Europe. But it has always been the presumption that the Soviet Union has initiated and borne the burden of a "policeman" role in Eastern Europe. These data imply, however, that the alliance as a whole responds, and that the effort implicit to the maintenance of Communist systems in the region has been shared in the last two decades.

Our ability to examine the relationship between popular disaffection and the performance dimension of military effort in the WTO is understandably limited. Yet in three East European countries with substantial records of turmoil (Hungary, Czechoslovakia, and Poland), changes in military-related performance from 1975-85 paralleled the direction and extent of changes in popular disaffection recorded in 1975/76-1970/80. If we assume a "lag" effect of a few years during which regime uncertainty continues an elevated commitment to military readiness, then performance effort in the early 1980's would still reflect political uneasiness of the late 1970's and 1980's. It seems clear that indications of impending unrest within the WTO are coincident with more military activity in Eastern Europe, not just the U.S.S.R. (See Table 3.)

TABLE 3.—POPULAR DISAFFECTION AND PERFORMANCE EFFORT IN THREE WARSAW PACT STATES

| | Disaffection growth rate ¹ (percent) | Net change performance burden, 1975 versus 1985 [CPE] |
|----------------------|---|---|
| Czechoslovakia | 42 | + .09 |
| Hungary | 50 | + .11 |
| Poland | 58 | + .19 |

¹ Disaffection Growth Rate: Calculated from data reported by RFE, East European Area Audience and Opinion Research, "Eastern Socialism-Western Democracy, and the Functioning of the Two Systems," (November 1981), p. 1a. Czechoslovak, Hungarian, and Polish visitors to Western Europe were polled during 1975-76 through 1979-80, with samples in each year for each nationality exceeding 2,000. One question, "How is Socialism working in . . . well, badly or very badly?" These responses were collapsed into positive and negative categories, with "do not know" responses omitted. A growth rate for negative responses was calculated using the formula $(N2-P2) - (N1-P1)/(N1-P1)$ (where N=percent negative and percent positive, and T1=1975-76 and T2=1979-80).

The greater consistency of the Warsaw Pact's extractive effort, as noted earlier, suggests that we ought not expect East-West relations and variations in the levels of inter-alliance cooperation to affect how much Pact members "take" from their society and economy. Their extractive defense effort is set by other agendas. Chief among these other influences is systemic integration, and within the index of systemic integration, the strongest relationship is clearly with CMEA trade dependency. By the mid-1980's, two-thirds or more of the imports to the U.S.S.R. and East Europe came from each other, except in Romania. Exports were somewhat more diversified, but not by much. This must be a powerful, albeit imprecise, influence on mutual ties. Interestingly, the ratio of Soviet troops to indigenous forces is slightly negative in its association with extractive burdens, while the link to force mobility is weak. Those states which trade most with the U.S.S.R. and its allies in Eastern Europe will very likely extract more from their society and economy for military purposes. Yet, neither a larger Soviet troop presence nor a more complete integration of a state's military into the Pact tends to ensure a greater extractive effort.

SUMMARY AND IMPLICATIONS

These preliminary analytical comments do not answer questions of causality, and leave open the development of an explanatory model for WTO military effort. Nevertheless, future examinations of this problem should be focused on the links between deteriorating political/economic conditions and higher performance efforts, and between elements of systemic integration (such as trade dependency) and extractive effort. Such explanations for defense commitments are, in the broadest respect, political—the relationships between a ruling Communist party and the people it rules, and between the U.S.S.R. and its allies. In part, these relationships can be explored through further alliancewide analyses. Ultimately, detailed political histories must accompany aggregate indicators—histories which examine the place of armed forces in a nation's past, and the degree to which a culture is compatible with defense effort.

There is little doubt, however, that military effort is substantially dispersed within the Warsaw Pact. WTO members contribute heavily to manpower within the Pact, are quite consistent in their expenditure levels relative to world standards, specialize in certain military activities, and respond to intra-alliance crises with greater performance efforts. The Warsaw Pact can no longer be dismissed as but a *de facto* Soviet occupation. Instead, the WTO involves the distribution of a collective good, i.e., security for the Communist Party regimes of the region from domestic challenges, and is characterized by the complex relationships of an alliance system. In that regard, the theory of collective goods expounded by Mancur Olson and Richard Zeckhauser²⁶ describes the general condition of the Warsaw Pact; the security of Communist Party regimes is sought by all WTO members and the U.S.S.R. contributes dispro-

²⁶ Olson and Zeckhauser, "An Economic Theory."

portionately to that effort. However, collective goods does little to explain variance across countries over time.

The debate over Soviet subsidization of Eastern Europe also appears to have little role in explaining the distribution of, and variance in, WTO military effort. Michael Marrese and Jan Vanous have held that, during the 1970's, the U.S.S.R. provided vast trade subsidies to Eastern Europe by paying more than world market prices for manufactured products from that region.²⁷ Paul Marer has argued forcefully that the Marrese-Vanous method of operationalizing such a trade subsidy is "biased upward."²⁸

That Eastern Europe has been "dependent" on the Soviet Union as a market for manufactured products, and as a source of energy inputs, is unquestioned. Yet, as Marer has noted, the degree of Soviet economic leverage (size of subsidy) in East European states has *not* been linked to these states' compliance with Soviet political or military objectives.²⁹ Trade dependence on the U.S.S.R. and other WTO allies and extractive effort may be related, as reported above, but performance effort is tied more closely to domestic conditions.

The Warsaw Pact's military effort thus must be explained through two levels of analysis. The U.S.S.R.'s interests clearly set general parameters within which WTO members must exist. Such external limits explain a great deal about the manpower levels of East European militaries. These external limits explain, to a lesser extent, the types of activities in which non-Soviet WTO forces may be engaged. Yet, the Warsaw Pact demonstrably is not an alliance in which the variance of either dimension of effort is explained well by Soviet examples or Soviet interests. Internal issues and demands constrain both the amount of resources allocated to the military *and* the range of military activity.

If this portrait of the Pact is accurate, then the Soviet Union's East European allies have become a less certain instrument of Soviet foreign policy. Both extractive and performance effort now appear more responsive to internal socioeconomic and political conditions than to external (Soviet) determinants. From Moscow's perspective, these would be disquieting implications, fraught with irony. In the WTO, the Soviets wanted a means of control, intervention, and penetration—an alliance in which Soviet dominance of all structures and training would limit the independent operation of national armies while enhancing Soviet security. After 30 years, however, the Pact's members have their own political dynamics which can explain changes in defense commitments equally as well as can dependence on the U.S.S.R. Should the transformation of WTO continue, the Soviet Union will be confronted by this irony—an alliance meant to ensure a zone of Soviet security now weakens that security by its susceptibility to domestic uncertainties in its East European members.

²⁷ Michael Marrese and Jan Vanous, *Soviet Subsidization of Trade With Eastern Europe: A Soviet Perspective* (Berkeley: Institute of International Studies, 1983).

²⁸ Paul Marer, "Intrabloc Economic Relations and Prospects," in David Holloway and Jane Sharp, eds., *The Warsaw Pact: Alliance in Transition* (Ithaca: Cornell University Press, 1984), p. 221.

²⁹ Marer, "Intrabloc Economic Relations," p. 231.

EAST EUROPEAN DEFENSE EXPENDITURES, 1975 TO 1987*

By Thad P. Alton, Gregor Lazarcik, Elizabeth M. Bass, and
Krzysztof Badach**

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SUMMARY

The revised and updated estimates in this paper, covering 1975-87, are essentially based on officially published defense budget appropriations. Shares of military outlays in the GNP for each country are estimated in current and constant domestic currencies and in U.S. dollars. As compared to our earlier estimates, we use revised series for military manpower and add estimates of military personnel costs known to be financed outside the defense budgets proper.

The distortions in pricing in the East European economies are such that the area's governments do not know the magnitude of military expenditures in terms of factor costs, despite *glasnost* and *perestroika* type discussions of changes in the economic systems. Thus even if official "reliable figures" on military expenditures were to become available, these figures could very substantially understate the burden of military expenditures viewed as opportunity

*The present contribution is a substantial revision and updating of Thad P. Alton, Gregor Lazarcik, Elizabeth M. Bass, and Krzysztof Badach, "East European Defense Expenditures, 1965-1982." in U.S. Congress, Joint Economic Committee, *East European Economies: Slow Growth in the 1980's*, Vol. I, Washington, U.S. Government Printing Office, 1985, pp. 475-495.

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cost. Indeed, recent statements in Soviet and East European sources support this view. Thus our findings given in tables in this study must be taken with strong reservations as regards factor cost or opportunity cost of Warsaw Pact military expenditures.

In the domestic currency estimates presented here, personnel costs are derived by applying local, East European pay rates and consumption values to manpower figures from Western sources. Other outlays, presumably on operations and maintenance, and procurements, are derived as residuals within the published budget totals. Additions are made to reflect personnel costs and small amounts of R&D financed outside the formal defense budgets, but it is certain that our estimates understate outlays for purposes other than personnel, possibly by major magnitudes.

The dollar estimates of East European military expenditures begin with direct pricing of manpower at United States pay rates to obtain current dollar series of personnel costs. The nonpersonnel costs are estimated by converting the domestic price budgetary residuals plus R&D into current dollars on the basis of ratios derived from our estimates of GNP in current domestic values and in dollars, for the respective countries and years. Reservations we have previously expressed as to the appropriateness of applying general GNP converters to the special field of military procurements remain valid. The domestic constant price measures use separate domestic deflators for personnel and nonpersonnel costs with a view to reflecting the domestic implications of real trends. The dollar constant price estimates simply deflate the current dollar estimates by the U.S. GNP deflator in the hope of expressing the diverse national values in some common measure for purposes of international comparisons, as well as of real changes, albeit with imperfections.

I. ESTIMATES OF EAST EUROPEAN DEFENSE EXPENDITURES BY MAJOR PURPOSE, IN CURRENT AND CONSTANT DOMESTIC CURRENCIES

The estimates shown in Table 1 summarize East European defense expenditures, 1975-87, in current and constant domestic prices. Both sets of values offer a breakdown between outlays related to supporting military personnel and residual appropriations from officially published defense ministry budgets, presumed to go to operations, maintenance, and procurements, plus outlays on research and development. The current price values given here differ from those in our earlier study for two major reasons. First, revised series on the military manpower underly the present personnel cost estimates. Second, these personnel costs now also include outlays from sources outside the defense ministry budgets. Nonpersonnel costs, as before, are initially derived as residuals within the defense budgets and are augmented for three countries by additional rough estimates for research and development of a military character financed outside of defense appropriations proper.

TABLE 1.—ESTIMATES OF DEFENSE EXPENDITURES BY MAJOR PURPOSE, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOMESTIC CURRENCIES, 1975–87

(Millions of domestic currencies)

| Country and year | In current prices | | | In constant prices | | |
|--|-------------------|-----------------|--------------------|--------------------|-----------------|--------------------|
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Bulgaria: Million leva, current prices; million leva, 1975 prices | | | | | | |
| 1975..... | 645 | 290 | 355 | 645 | 290 | 355 |
| 1976..... | 694 | 298 | 396 | 649 | 288 | 361 |
| 1977..... | 754 | 310 | 443 | 618 | 285 | 333 |
| 1978..... | 795 | 316 | 479 | 630 | 281 | 349 |
| 1979..... | 856 | 335 | 521 | 631 | 283 | 348 |
| 1980..... | 988 | 391 | 597 | 558 | 281 | 277 |
| 1981..... | 1,054 | 406 | 648 | 598 | 281 | 317 |
| 1982..... | 1,097 | 416 | 680 | 583 | 287 | 296 |
| 1983..... | 1,126 | 428 | 697 | 545 | 284 | 261 |
| 1984..... | 1,191 | 441 | 750 | 599 | 286 | 313 |
| 1985..... | 1,218 | 456 | 762 | 545 | 287 | 258 |
| 1986..... | 1,285 | 476 | 809 | 605 | 293 | 312 |
| 1987..... | 1,349 | 495 | 854 | 512 | 301 | 211 |
| Czechoslovakia: Million crowns, current prices; million crowns, 1977 prices | | | | | | |
| 1975..... | 21,878 | 6,422 | 15,456 | 19,786 | 6,560 | 13,226 |
| 1976..... | 22,337 | 6,594 | 15,744 | 20,313 | 6,627 | 13,686 |
| 1977..... | 22,311 | 6,913 | 15,399 | 22,312 | 6,913 | 15,399 |
| 1978..... | 23,474 | 7,190 | 16,283 | 21,823 | 7,022 | 14,801 |
| 1979..... | 24,011 | 7,490 | 16,521 | 20,443 | 7,039 | 13,404 |
| 1980..... | 25,339 | 7,814 | 17,525 | 21,057 | 7,078 | 13,979 |
| 1981..... | 25,528 | 8,049 | 17,478 | 21,844 | 7,155 | 14,689 |
| 1982..... | 27,040 | 8,422 | 18,618 | 22,117 | 7,337 | 14,780 |
| 1983..... | 27,902 | 8,733 | 19,169 | 21,855 | 7,509 | 14,346 |
| 1984..... | 29,179 | 9,019 | 20,159 | 22,323 | 7,650 | 14,673 |
| 1985..... | 30,290 | 9,385 | 20,905 | 21,892 | 7,854 | 14,038 |
| 1986..... | 31,506 | 9,632 | 21,874 | NA | NA | NA |
| 1987..... | 33,498 | 10,007 | 23,491 | NA | NA | NA |
| German Democratic Republic: Million marks, current prices; million marks, 1975 prices | | | | | | |
| 1975..... | 8,877 | 2,549 | 6,328 | 8,877 | 2,549 | 6,328 |
| 1976..... | 9,209 | 2,670 | 6,539 | 8,974 | 2,652 | 6,322 |
| 1977..... | 9,742 | 2,780 | 6,962 | 9,467 | 2,678 | 6,789 |
| 1978..... | 10,204 | 2,863 | 7,341 | 9,331 | 2,737 | 6,594 |
| 1979..... | 10,693 | 2,975 | 7,718 | 9,554 | 2,786 | 6,768 |
| 1980..... | 11,481 | 3,036 | 8,446 | 10,364 | 2,765 | 7,599 |
| 1981..... | 12,366 | 3,151 | 9,215 | 10,475 | 2,823 | 7,652 |
| 1982..... | 13,021 | 3,224 | 9,797 | 9,693 | 2,828 | 6,865 |
| 1983..... | 13,711 | 3,294 | 10,416 | 8,546 | 2,920 | 5,626 |
| 1984..... | 14,627 | 3,415 | 11,213 | 9,297 | 2,934 | 6,363 |
| 1985..... | 15,541 | 3,532 | 12,010 | 9,139 | 2,986 | 6,153 |
| 1986..... | 16,661 | 3,656 | 13,005 | 9,277 | 3,027 | 6,250 |
| 1987..... | 17,892 | 3,801 | 14,091 | 9,865 | 3,113 | 6,752 |
| Hungary: Million forints, current prices; million forints, 1976 prices | | | | | | |
| 1975..... | 13,181 | 3,996 | 9,185 | 14,262 | 4,256 | 10,006 |
| 1976..... | 13,125 | 4,266 | 8,859 | 13,125 | 4,266 | 8,859 |
| 1977..... | 14,209 | 4,717 | 9,492 | 13,449 | 4,544 | 8,905 |
| 1978..... | 16,716 | 5,040 | 11,676 | 15,021 | 4,667 | 10,354 |
| 1979..... | 18,007 | 5,336 | 12,671 | 15,047 | 4,503 | 10,544 |
| 1980..... | 19,612 | 5,720 | 13,892 | 16,350 | 4,486 | 11,864 |

TABLE 1.—ESTIMATES OF DEFENSE EXPENDITURES BY MAJOR PURPOSE, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOMESTIC CURRENCIES, 1975-87—Continued

[Millions of domestic currencies]

| Country and year | In current prices | | | In constant prices | | |
|--|-------------------|-----------------|--------------------|--------------------|-----------------|--------------------|
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 1981..... | 21,129 | 6,068 | 15,061 | 16,126 | 4,512 | 11,614 |
| 1982..... | 22,354 | 6,393 | 15,961 | 16,320 | 4,436 | 11,884 |
| 1983..... | 24,103 | 6,714 | 17,389 | 16,238 | 4,304 | 11,934 |
| 1984..... | 25,228 | 7,477 | 17,751 | 15,857 | 4,411 | 11,446 |
| 1985..... | 26,528 | 8,236 | 18,292 | 15,075 | 4,515 | 10,560 |
| 1986..... | 28,446 | 8,802 | 19,644 | 16,009 | 4,544 | 11,465 |
| 1987..... | 31,218 | 9,639 | 21,579 | 15,759 | 4,519 | 11,240 |
| Poland: Million current zlotys; million 1977 zlotys | | | | | | |
| 1975..... | 60,167 | 14,569 | 45,598 | 75,154 | 17,059 | 58,095 |
| 1976..... | 65,429 | 16,421 | 49,008 | 70,195 | 17,791 | 52,404 |
| 1977..... | 72,919 | 18,599 | 54,320 | 72,919 | 18,599 | 54,320 |
| 1978..... | 75,575 | 20,204 | 55,371 | 71,837 | 18,535 | 53,302 |
| 1979..... | 81,444 | 22,607 | 58,837 | 75,638 | 19,029 | 56,609 |
| 1980..... | 85,897 | 25,766 | 60,131 | 78,955 | 19,300 | 59,655 |
| 1981..... | 97,354 | 32,422 | 64,932 | 96,472 | 19,005 | 77,467 |
| 1982..... | 211,610 | 52,761 | 158,849 | 77,047 | 16,862 | 60,185 |
| 1983..... | 231,610 | 66,185 | 165,425 | 75,800 | 17,463 | 58,337 |
| 1984..... | 300,217 | 79,672 | 220,545 | 80,543 | 18,091 | 62,452 |
| 1985..... | 375,856 | 95,929 | 279,927 | 80,545 | 18,906 | 61,639 |
| 1986..... | 454,395 | 117,816 | 336,579 | 80,050 | 18,954 | 61,096 |
| 1987..... | 555,658 | 142,731 | 412,927 | 71,181 | 17,850 | 53,331 |
| Romania: Million lei, current prices; million lei, 1977 prices | | | | | | |
| 1975..... | 11,048 | 3,860 | 7,188 | 11,140 | 3,987 | 7,153 |
| 1976..... | 11,975 | 4,564 | 7,411 | 11,981 | 4,559 | 7,422 |
| 1977..... | 12,453 | 4,258 | 8,195 | 12,453 | 4,258 | 8,195 |
| 1978..... | 13,365 | 4,712 | 8,653 | 12,693 | 4,475 | 8,218 |
| 1979..... | 13,572 | 4,939 | 8,633 | 12,726 | 4,486 | 8,240 |
| 1980..... | 12,244 | 5,269 | 6,975 | 10,861 | 4,542 | 6,319 |
| 1981..... | 12,442 | 5,560 | 6,882 | 10,892 | 4,399 | 6,493 |
| 1982..... | 13,438 | 6,033 | 7,405 | 10,344 | 4,085 | 6,259 |
| 1983..... | 13,933 | 6,694 | 7,239 | 10,095 | 4,310 | 5,785 |
| 1984..... | 14,338 | 7,212 | 7,127 | 10,088 | 4,594 | 5,494 |
| 1985..... | 14,616 | 7,434 | 7,182 | 9,712 | 4,750 | 4,962 |
| 1986..... | 14,741 | 7,530 | 7,211 | 10,242 | 4,817 | 5,425 |
| 1987..... | 14,352 | 8,278 | 6,075 | 9,293 | 5,289 | 4,004 |

A fairly narrow concept of "military purpose" underlies these estimates. The intention is to reflect current outlays to support, equip, and administer armed forces (army, navy, air force, and border guards organized and equipped as army units), plus research and development directly related to military purposes. Some military personnel outlays financed outside the formal East European defense budgets, such as benefits to soldiers' families, paid leave for reservists, and retirement pensions, are now included in our estimates. We have not, however, attempted to reflect industrial investments related to armaments production, although investment outlays made directly by ministries of defense would be implicitly included in the nonpersonnel cost residuals.

The same basic estimation method was followed for all the six countries covered. Working from estimates of regular forces and "paramilitary" border and security troops furnished by ACDA, the pay and subsistence of these forces were estimated with reference to national wage rates and consumption data. Exact procedures varied somewhat with the availability of data for different countries, but the general approach for this study was more standardized than in our earlier estimates. Briefly, we assigned officers' pay on a par with average wages and salaries in engineering branches of industry, assumed that enlisted men's pocket money would amount to 5 percent of officers' pay, and that subsistence per man would equal average consumers' outlays on food, clothing, and footwear. These estimated values of pay and subsistence were then deducted from total defense budget expenditures to obtain estimates for operations (including costs of civilian personnel and other administrative expenses), maintenance, and procurements (other than supplies for the subsistence of uniformed personnel) to the extent that procurements are included in formal defense budgets. In this context it should be noted that for Bulgaria, the annual totals for the defense budget are themselves estimates, as official information has for many years been confined to a simple statement to the effect that sufficient funds have been appropriated.

Additional estimates were made for two elements of extra-budgetary outlays, for certain personnel costs in all six countries, and with regard to Czechoslovakia, the GDR, and Poland, for military research and development believed to be financed outside defense budgets. Values of extra-budgetary aid to soldiers' families, payments to conscripts, pay for reservists on active duty, and military pensions, estimated for 1974 in *OP-63*, Table 2.1,¹ were extended to later years by assuming that pension outlays would rise with average wages and that the other items would vary both with the number of active military personnel and with wage levels. Research and development estimates were based on budget appropriations for science and research, of which a portion were assumed to be military.

Inevitably, these estimates are rough approximations. Many choices underlie them, some involving no small element of arbitrariness. We assume that 80 percent of the manpower consist of enlisted men and 20 percent of officers, for all countries and all years. We treat all paramilitary forces (border guards, security troops) as though they were financed out of defense budget appropriations uniformly in all countries, whereas in some cases they may actually be supported by budgets of other ministries. To the extent that we thus overestimate the budget element of personnel costs, our estimates of nonpersonnel costs will be too low. It is quite possible that they are too low anyway because, if East European budget practices follow those of the Soviet Union, defense budgets will routinely omit significant magnitudes of outlays on procurements. Marshal S.F. Akhromeyev, chief of Soviet General Staff, was reported in the *New York Times* of October 30, 1987, to have stated in an interview, "For instance, the defense budget that we

¹ Research Project on National Income in East Central Europe, *Military Expenditures in Eastern Europe, Post World War II to 1979*, Occasional Paper No. 63 [*OP-63*], New York, 1980.

make public serves to reflect the Soviet Ministry of Defense's spending on military personnel, logistics, combat training, pensions, and several other items. Funds for arms procurements are appropriated under other items of the Soviet Union's state budget."

A few recent bits of information from Eastern Europe seem to support the conjecture that substantial military expenditures will pass outside of the ministry of defense budgets. For instance, according to the Polish weekly, *Zycie gospodarcze*, output of Polish defense industries in 1987 was 8 percent of total industrial output, or 1,477.1 billion zlotys, of which, in this crisis year, 886.3 billion zlotys worth could be used for civilian rather than military purposes. This implies 590.8 billion in production exclusively for military purposes, or more than the Minister of Defense can have bought from a budgetary appropriation totalling 467.7 billion before allowance for personnel costs, or from our estimated total of 412.9 billion zlotys for all nonpersonnel expenditures. (See Table 1.) Poland may, of course, be a net exporter of military goods. Also, it is probable that real values are higher under a given expenditure for military goods than for civilian output owing to pricing at fixed subsidized prices (so-called *ceny urzedowe*). Profits on civilian items, such as TV sets, may be used to offset losses, and this would affect, but not necessarily exclude subsidies from nondefense ministries in the state budget.

Similar inferences could be drawn from values given with regard to defense budget cuts in Romania, where a November 1986 referendum calling for a 5-percent cut in defense spending was said to portend an estimated 1,350 million lei reduction in 1987. The implicit budget total would be 27.0 billion, as opposed to the official defense appropriation of 11,597 million.

In deflating the current price estimates into constant domestic prices, personnel costs and other outlays were handled separately. Personnel costs in current prices (col. 2 of Table 1), consisting of the sum of estimated defense budget and extra-budgetary outlays as outlined above, were deflated into constant price values (col. 5 of Table 1) by applying indexes of consumer prices. The price indexes used were independently derived for each respective country, by comparing a constant price index of personal consumption based on physical quantity series applied to base year weights to official indexes of personal consumption in current prices.²

For nonpersonnel outlays (columns 3 and 6 of Table 1), deflation for each of the six countries was done by an independently derived implicit price index intended to reflect the movement of prices of investment and military goods with respect to a given base year. The indexes in question were constructed on the basis of annual estimates of GNP at adjusted factor cost for particular countries and base years and their counterpart estimates of domestic final uses of gross product. From the estimated annual totals of gross product domestically used, we subtracted base year weighted values for personal consumption, civilian government services, and military personnel costs (deflated to base year prices as described above), leav-

² Research Project on National Income in East Central Europe, *Money Income of the Population and Standard of Living in Eastern Europe, 1970-1987*, Occasional Paper No. 103 [OP-103], New York, 1988, Tables 1.1 to 1.6, columns referring to alternative indexes of consumer prices.

ing values presumably reflecting investment, inventory changes, and military nonpersonnel costs, as well as omissions and discrepancies. An index of this residual was then juxtaposed to an index calculated from the sum of investment and inventory changes as officially reported in current prices, yielding the implicit deflator applied to obtain values of military nonpersonnel outlays in the constant prices of the respective base years. In the case of Czechoslovakia, we encountered difficulties with the basic data required for estimating 1986 and 1987. Czechoslovakia changed the constant price base of published data in 1985, from 1977 constant prices to 1984 constant prices, and as a result, a number of the basic data involved are not adequately defined for 1986 and 1987. We therefore elected not to offer constant price estimates for these years at this time.

II. ESTIMATES OF EAST EUROPEAN MILITARY EXPENDITURES BY MAJOR PURPOSE IN CURRENT AND CONSTANT DOLLARS, GNP AND NATIONAL CURRENCY CONVERSION RATES

The dollar counterparts to our domestic currency estimates are shown in Table 2. Again, the outlays are divided into personnel costs (cols. 2 and 5) and other outlays (cols. 3 and 6). For personnel costs, our current dollar estimates are a matter of directly pricing East European manpower at United States pay rates. For the other outlays, dollar values were calculated by converting our current price domestic estimates (Table 1, col. 3) into current dollars using rates derived from estimated values of GNP, as shown in Table 3 (cols. 1-3).

TABLE 2.—ESTIMATES OF DEFENSE EXPENDITURES BY MAJOR PURPOSE, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87

[Millions of U.S. dollars]

| Country and year | Millions of current dollars | | | Millions of 1987 dollars | | |
|------------------------|-----------------------------|-----------------|--------------------|--------------------------|-----------------|--------------------|
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Bulgaria: | | | | | | |
| 1975..... | 2,900 | 2,367 | 533 | 5,766 | 4,706 | 1,060 |
| 1976..... | 3,091 | 2,477 | 614 | 5,774 | 4,628 | 1,147 |
| 1977..... | 3,314 | 2,604 | 710 | 5,804 | 4,561 | 1,243 |
| 1978..... | 3,566 | 2,769 | 797 | 5,821 | 4,520 | 1,301 |
| 1979..... | 3,832 | 2,926 | 906 | 5,745 | 4,387 | 1,358 |
| 1980..... | 4,268 | 3,319 | 949 | 5,862 | 4,559 | 1,303 |
| 1981..... | 4,694 | 3,610 | 1,084 | 5,878 | 4,520 | 1,358 |
| 1982..... | 5,424 | 4,224 | 1,200 | 6,384 | 4,972 | 1,412 |
| 1983..... | 5,646 | 4,424 | 1,222 | 6,396 | 5,012 | 1,384 |
| 1984..... | 5,863 | 4,538 | 1,325 | 6,408 | 4,960 | 1,448 |
| 1985..... | 6,082 | 4,772 | 1,310 | 6,455 | 5,064 | 1,391 |
| 1986..... | 6,372 | 4,950 | 1,422 | 6,585 | 5,115 | 1,469 |
| 1987..... | 6,656 | 5,170 | 1,486 | 6,656 | 5,170 | 1,486 |
| Czechoslovakia: | | | | | | |
| 1975..... | 3,989 | 2,258 | 1,731 | 7,931 | 4,489 | 3,442 |
| 1976..... | 4,223 | 2,358 | 1,866 | 7,890 | 4,404 | 3,485 |
| 1977..... | 4,567 | 2,521 | 2,046 | 7,999 | 4,416 | 3,583 |
| 1978..... | 4,948 | 2,713 | 2,235 | 8,077 | 4,430 | 3,648 |
| 1979..... | 5,282 | 2,915 | 2,367 | 7,919 | 4,371 | 3,548 |

TABLE 2.—ESTIMATES OF DEFENSE EXPENDITURES BY MAJOR PURPOSE, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87—Continued

(Millions of U.S. dollars)

| Country and year | Millions of current dollars | | | Millions of 1987 dollars | | |
|------------------------------------|-----------------------------|-----------------|--------------------|--------------------------|-----------------|--------------------|
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 1980..... | 6,019 | 3,361 | 2,658 | 8,267 | 4,616 | 3,651 |
| 1981..... | 6,707 | 3,733 | 2,974 | 8,398 | 4,674 | 3,724 |
| 1982..... | 7,728 | 4,451 | 3,277 | 9,096 | 5,239 | 3,857 |
| 1983..... | 8,213 | 4,737 | 3,475 | 9,303 | 5,367 | 3,937 |
| 1984..... | 8,590 | 4,948 | 3,643 | 9,388 | 5,407 | 3,981 |
| 1985..... | 9,104 | 5,292 | 3,813 | 9,662 | 5,616 | 4,046 |
| 1986..... | 9,664 | 5,581 | 4,083 | 9,986 | 5,767 | 4,219 |
| 1987..... | 10,319 | 4,819 | 4,501 | 10,319 | 5,819 | 4,501 |
| German Democratic Republic: | | | | | | |
| 1975..... | 5,363 | 2,793 | 2,570 | 10,663 | 5,553 | 5,110 |
| 1976..... | 5,839 | 2,967 | 2,872 | 10,908 | 5,542 | 5,366 |
| 1977..... | 6,259 | 3,159 | 3,100 | 10,962 | 5,532 | 5,430 |
| 1978..... | 6,794 | 3,349 | 3,445 | 11,090 | 5,467 | 5,623 |
| 1979..... | 7,464 | 3,567 | 3,897 | 11,192 | 5,348 | 5,843 |
| 1980..... | 8,268 | 4,028 | 4,240 | 11,355 | 5,532 | 5,823 |
| 1981..... | 9,353 | 4,450 | 4,904 | 11,711 | 5,571 | 6,140 |
| 1982..... | 10,670 | 5,254 | 5,417 | 12,559 | 6,183 | 6,376 |
| 1983..... | 11,335 | 5,541 | 5,795 | 12,841 | 6,277 | 6,564 |
| 1984..... | 12,114 | 5,775 | 6,339 | 13,239 | 6,311 | 6,928 |
| 1985..... | 12,714 | 6,098 | 6,616 | 13,493 | 6,472 | 7,021 |
| 1986..... | 13,471 | 6,306 | 7,165 | 13,920 | 6,516 | 7,404 |
| 1987..... | 14,444 | 6,524 | 7,920 | 14,444 | 6,524 | 7,920 |
| Hungary: | | | | | | |
| 1975..... | 2,177 | 1,496 | 681 | 4,327 | 2,973 | 1,354 |
| 1976..... | 2,194 | 1,580 | 613 | 4,098 | 2,952 | 1,146 |
| 1977..... | 2,390 | 1,713 | 677 | 4,186 | 3,000 | 1,185 |
| 1978..... | 2,650 | 1,803 | 847 | 4,327 | 2,943 | 1,383 |
| 1979..... | 2,816 | 1,888 | 928 | 4,222 | 2,831 | 1,391 |
| 1980..... | 3,199 | 2,128 | 1,071 | 4,393 | 2,922 | 1,470 |
| 1981..... | 3,476 | 2,298 | 1,177 | 4,352 | 2,878 | 1,474 |
| 1982..... | 3,919 | 2,665 | 1,254 | 4,612 | 3,137 | 1,476 |
| 1983..... | 4,082 | 2,757 | 1,326 | 4,625 | 3,123 | 1,502 |
| 1984..... | 4,143 | 2,822 | 1,321 | 4,528 | 3,084 | 1,443 |
| 1985..... | 4,213 | 2,951 | 1,263 | 4,472 | 3,132 | 1,340 |
| 1986..... | 4,380 | 3,021 | 1,359 | 4,526 | 3,122 | 1,404 |
| 1987..... | 4,525 | 3,141 | 1,384 | 4,525 | 3,141 | 1,384 |
| Poland: | | | | | | |
| 1975..... | 7,344 | 4,299 | 3,046 | 14,602 | 8,547 | 6,055 |
| 1976..... | 7,607 | 4,610 | 2,996 | 14,212 | 8,614 | 5,598 |
| 1977..... | 8,527 | 5,178 | 3,349 | 14,935 | 9,070 | 5,866 |
| 1978..... | 9,136 | 5,669 | 3,467 | 14,914 | 9,254 | 5,660 |
| 1979..... | 10,120 | 6,241 | 3,880 | 15,174 | 9,357 | 5,817 |
| 1980..... | 11,320 | 7,218 | 4,102 | 15,547 | 9,914 | 5,634 |
| 1981..... | 12,229 | 7,970 | 4,260 | 15,313 | 9,979 | 5,334 |
| 1982..... | 14,503 | 9,440 | 5,063 | 17,070 | 11,111 | 5,959 |
| 1983..... | 14,620 | 10,001 | 4,619 | 16,562 | 11,330 | 5,232 |
| 1984..... | 15,913 | 10,416 | 5,497 | 17,391 | 11,383 | 6,008 |
| 1985..... | 17,094 | 11,053 | 6,041 | 18,142 | 11,730 | 6,411 |
| 1986..... | 17,759 | 11,533 | 6,226 | 18,352 | 11,917 | 6,434 |
| 1987..... | 17,953 | 11,934 | 6,020 | 17,953 | 11,934 | 6,020 |
| Romania: | | | | | | |
| 1975..... | 3,568 | 2,761 | 807 | 7,094 | 5,489 | 1,605 |
| 1976..... | 3,675 | 2,772 | 903 | 6,865 | 5,178 | 1,687 |

TABLE 2.—ESTIMATES OF DEFENSE EXPENDITURES BY MAJOR PURPOSE, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87—Continued

[Millions of U.S. dollars]

| Country and year | Millions of current dollars | | | Millions of 1987 dollars | | |
|------------------|-----------------------------|-----------------|--------------------|--------------------------|-----------------|--------------------|
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 1977..... | 3,924 | 2,916 | 1,007 | 6,872 | 5,108 | 1,764 |
| 1978..... | 4,211 | 3,102 | 1,109 | 6,874 | 5,064 | 1,810 |
| 1979..... | 4,448 | 3,287 | 1,161 | 6,669 | 4,929 | 1,740 |
| 1980..... | 4,729 | 3,739 | 989 | 6,494 | 5,136 | 1,359 |
| 1981..... | 5,114 | 4,085 | 1,029 | 6,403 | 5,115 | 1,288 |
| 1982..... | 5,811 | 4,797 | 1,013 | 6,839 | 5,646 | 1,193 |
| 1983..... | 6,414 | 5,429 | 985 | 7,266 | 6,150 | 1,116 |
| 1984..... | 6,659 | 5,671 | 988 | 7,277 | 6,197 | 1,080 |
| 1985..... | 6,948 | 5,967 | 981 | 7,374 | 6,333 | 1,041 |
| 1986..... | 7,223 | 6,182 | 1,041 | 7,464 | 6,389 | 1,075 |
| 1987..... | 7,609 | 6,707 | 902 | 7,609 | 6,707 | 902 |
| Eastern Europe: | | | | | | |
| 1975..... | 25,341 | 15,973 | 9,368 | 50,382 | 31,757 | 18,625 |
| 1976..... | 26,628 | 16,763 | 9,864 | 49,747 | 31,318 | 18,429 |
| 1977..... | 28,980 | 18,091 | 10,889 | 50,758 | 31,686 | 19,072 |
| 1978..... | 31,304 | 19,405 | 11,900 | 51,103 | 31,677 | 19,426 |
| 1979..... | 33,962 | 20,825 | 13,138 | 50,922 | 31,224 | 19,698 |
| 1980..... | 37,803 | 23,793 | 14,010 | 51,918 | 32,678 | 19,241 |
| 1981..... | 41,573 | 26,145 | 15,428 | 52,055 | 32,737 | 19,318 |
| 1982..... | 48,054 | 30,831 | 17,223 | 56,560 | 36,288 | 20,272 |
| 1983..... | 50,311 | 32,890 | 17,421 | 56,993 | 37,258 | 19,735 |
| 1984..... | 53,283 | 34,170 | 19,113 | 58,230 | 37,342 | 20,888 |
| 1985..... | 56,155 | 36,133 | 20,022 | 59,598 | 38,349 | 21,250 |
| 1986..... | 58,869 | 37,574 | 21,295 | 60,833 | 38,827 | 22,005 |
| 1987..... | 61,507 | 39,294 | 22,213 | 61,507 | 39,294 | 22,213 |

TABLE 3.—GNP, DEFENSE EXPENDITURES, AND IMPLICIT CONVERSION RATES, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87

| Country and year | GNP | | Implicit conversion rate (1\$=unit of EE currency) | Indexes in current dollars (1975=100) | | Defense as percentage of GNP in: | |
|------------------|--------------------------|-----------------------------|---|--|---------|-------------------------------------|---------|
| | Millions of 1987 dollars | Millions of current dollars | | GNP | Defense | Domestic currencies | Dollars |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Bulgaria: | | | | | | | |
| 1975..... | 56,232 | 28,283 | .67 | 100.0 | 100.0 | 2.9 | 10.3 |
| 1976..... | 57,919 | 31,002 | .64 | 109.6 | 106.6 | 3.0 | 10.0 |
| 1977..... | 57,357 | 32,747 | .62 | 115.8 | 114.3 | 3.2 | 10.1 |
| 1978..... | 58,594 | 35,893 | .60 | 126.9 | 123.0 | 3.2 | 9.9 |
| 1979..... | 60,843 | 40,579 | .57 | 143.5 | 132.1 | 3.2 | 9.4 |
| 1980..... | 59,100 | 43,032 | .63 | 152.1 | 147.2 | 3.2 | 9.9 |
| 1981..... | 60,674 | 48,457 | .60 | 171.3 | 161.9 | 3.2 | 9.7 |
| 1982..... | 62,586 | 53,174 | .57 | 188.0 | 187.0 | 3.2 | 10.2 |
| 1983..... | 61,518 | 54,305 | .57 | 192.0 | 194.7 | 3.2 | 10.4 |
| 1984..... | 63,486 | 58,092 | .57 | 205.4 | 202.2 | 3.2 | 10.1 |
| 1985..... | 61,293 | 57,752 | .58 | 204.2 | 209.7 | 3.2 | 10.5 |
| 1986..... | 64,329 | 62,253 | .57 | 220.1 | 219.7 | 3.2 | 10.2 |
| 1987..... | 64,779 | 64,779 | .57 | 229.0 | 229.5 | 3.2 | 10.3 |
| Czechoslovakia: | | | | | | | |
| 1975..... | 123,495 | 62,115 | 8.93 | 100.0 | 100.0 | 3.3 | 6.4 |

TABLE 3.—GNP, DEFENSE EXPENDITURES, AND IMPLICIT CONVERSION RATES, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87—Continued

| Country and year | GNP | | Implicit conversion rate (1\$=unit of EE currency) | Indexes in current dollars (1975=100) | | Defense as percentage of GNP in: | |
|-----------------------------|--------------------------|-----------------------------|---|--|---------|----------------------------------|---------|
| | Millions of 1987 dollars | Millions of current dollars | | GNP | Defense | Domestic currencies | Dollars |
| | (1) | (2) | | (4) | (5) | (6) | (7) |
| 1976..... | 125,718 | 67,292 | 8.44 | 108.3 | 105.9 | 3.3 | 6.3 |
| 1977..... | 131,152 | 74,880 | 7.53 | 120.6 | 114.5 | 3.3 | 6.1 |
| 1978..... | 133,251 | 81,626 | 7.29 | 131.4 | 124.0 | 3.3 | 6.1 |
| 1979..... | 134,363 | 89,613 | 6.98 | 144.3 | 132.4 | 3.2 | 5.9 |
| 1980..... | 137,573 | 100,170 | 6.59 | 161.3 | 150.9 | 3.2 | 6.0 |
| 1981..... | 136,956 | 109,379 | 5.88 | 176.1 | 168.1 | 3.3 | 6.1 |
| 1982..... | 139,549 | 118,564 | 5.68 | 190.9 | 193.7 | 3.4 | 6.5 |
| 1983..... | 141,649 | 125,041 | 5.52 | 201.3 | 205.9 | 3.4 | 6.6 |
| 1984..... | 145,107 | 132,778 | 5.53 | 213.8 | 215.3 | 3.3 | 6.5 |
| 1985..... | 146,218 | 137,770 | 5.48 | 221.8 | 228.2 | 3.4 | 6.6 |
| 1986..... | 149,305 | 144,485 | 5.36 | 232.6 | 242.3 | 3.4 | 6.7 |
| 1987..... | 151,281 | 151,281 | 5.22 | 243.6 | 258.7 | 3.6 | 6.8 |
| German Democratic Republic: | | | | | | | |
| 1975..... | 154,334 | 77,626 | 2.46 | 100.0 | 100.0 | 3.9 | 6.9 |
| 1976..... | 157,421 | 84,261 | 2.35 | 108.5 | 108.9 | 4.0 | 6.9 |
| 1977..... | 162,205 | 92,610 | 2.25 | 119.3 | 116.7 | 4.0 | 6.8 |
| 1978..... | 164,983 | 101,064 | 2.13 | 130.2 | 126.7 | 4.0 | 6.7 |
| 1979..... | 169,613 | 113,123 | 1.98 | 145.7 | 139.2 | 4.1 | 6.6 |
| 1980..... | 173,163 | 126,084 | 1.99 | 162.4 | 154.2 | 3.9 | 6.6 |
| 1981..... | 176,712 | 141,130 | 1.87 | 181.8 | 174.4 | 4.0 | 6.6 |
| 1982..... | 176,095 | 149,614 | 1.81 | 192.7 | 199.0 | 4.2 | 7.1 |
| 1983..... | 178,410 | 157,492 | 1.80 | 202.9 | 211.4 | 4.2 | 7.2 |
| 1984..... | 184,583 | 168,901 | 1.77 | 217.6 | 225.9 | 4.3 | 7.2 |
| 1985..... | 189,831 | 178,864 | 1.82 | 230.4 | 237.1 | 4.2 | 7.1 |
| 1986..... | 192,763 | 186,540 | 1.82 | 240.3 | 251.2 | 4.4 | 7.2 |
| 1987..... | 196,930 | 196,930 | 1.78 | 253.7 | 269.3 | 4.5 | 7.3 |
| Hungary: | | | | | | | |
| 1975..... | 74,332 | 37,387 | 13.49 | 100.0 | 100.0 | 2.3 | 5.8 |
| 1976..... | 74,555 | 39,906 | 14.44 | 106.7 | 100.8 | 2.0 | 5.5 |
| 1977..... | 79,238 | 45,240 | 14.03 | 121.0 | 109.8 | 2.0 | 5.3 |
| 1978..... | 81,171 | 49,723 | 13.78 | 133.0 | 121.8 | 2.2 | 5.3 |
| 1979..... | 81,319 | 54,236 | 13.65 | 145.1 | 129.4 | 2.2 | 5.2 |
| 1980..... | 82,137 | 59,806 | 12.98 | 160.0 | 147.0 | 2.3 | 5.3 |
| 1981..... | 82,732 | 66,073 | 12.79 | 176.7 | 159.7 | 2.3 | 5.3 |
| 1982..... | 85,705 | 72,816 | 12.73 | 194.8 | 180.0 | 2.2 | 5.4 |
| 1983..... | 84,813 | 74,869 | 13.12 | 200.3 | 187.6 | 2.2 | 5.5 |
| 1984..... | 87,043 | 79,647 | 13.44 | 213.0 | 190.3 | 2.1 | 5.2 |
| 1985..... | 84,813 | 79,913 | 14.49 | 213.7 | 193.6 | 2.1 | 5.3 |
| 1986..... | 86,597 | 83,801 | 14.46 | 224.1 | 201.2 | 2.1 | 5.2 |
| 1987..... | 87,637 | 87,637 | 15.59 | 234.4 | 207.9 | 2.0 | 5.2 |
| Poland: | | | | | | | |
| 1975..... | 242,545 | 121,994 | 14.14 | 100.0 | 100.0 | 3.0 | 6.0 |
| 1976..... | 248,609 | 133,070 | 15.39 | 109.1 | 103.6 | 2.8 | 5.7 |
| 1977..... | 253,217 | 144,572 | 15.35 | 118.5 | 116.1 | 2.9 | 5.9 |
| 1978..... | 262,434 | 160,760 | 15.13 | 131.8 | 124.4 | 2.7 | 5.7 |
| 1979..... | 257,583 | 171,795 | 14.40 | 140.8 | 137.8 | 2.9 | 5.9 |
| 1980..... | 251,034 | 182,784 | 13.93 | 149.8 | 154.1 | 2.9 | 6.2 |
| 1981..... | 237,694 | 189,832 | 14.55 | 155.6 | 166.5 | 3.0 | 6.4 |
| 1982..... | 235,269 | 199,888 | 30.39 | 163.9 | 197.5 | 3.1 | 7.3 |
| 1983..... | 247,153 | 218,175 | 34.71 | 178.8 | 199.1 | 2.7 | 6.7 |
| 1984..... | 256,128 | 234,366 | 39.17 | 192.1 | 216.7 | 2.9 | 6.8 |
| 1985..... | 258,796 | 243,844 | 45.39 | 199.9 | 232.7 | 3.1 | 7.0 |
| 1986..... | 266,072 | 257,482 | 53.11 | 211.1 | 241.8 | 3.0 | 6.9 |

TABLE 3.—GNP, DEFENSE EXPENDITURES, AND IMPLICIT CONVERSION RATES, EAST EUROPEAN COUNTRIES, IN CURRENT AND CONSTANT DOLLARS, 1975-87—Continued

| Country and year | GNP | | Implicit conversion rate (1\$=unit of EE currency) | Indexes in current dollars (1975=100) | | Defense as percentage of GNP in: | |
|------------------|--------------------------------|-----------------------------------|---|--|---------|-------------------------------------|---------|
| | Millions of 1987 dollars | Millions of current dollars | | GNP | Defense | Domestic currencies | Dollars |
| | (1) | (2) | | (4) | (5) | (6) | (7) |
| 1987..... | 259,523 | 259,523 | 67.52 | 212.7 | 244.5 | 2.9 | 6.9 |
| Romania: | | | | | | | |
| 1975..... | 100,475 | 50,536 | 8.91 | 100.0 | 100.0 | 2.2 | 7.1 |
| 1976..... | 111,226 | 59,535 | 8.21 | 117.8 | 103.0 | 2.2 | 6.2 |
| 1977..... | 114,140 | 65,167 | 8.13 | 129.0 | 110.0 | 2.1 | 6.0 |
| 1978..... | 119,465 | 73,181 | 7.80 | 144.8 | 118.0 | 2.1 | 5.8 |
| 1979..... | 123,785 | 82,559 | 7.44 | 163.4 | 124.7 | 1.9 | 5.4 |
| 1980..... | 121,876 | 88,741 | 7.05 | 175.6 | 132.5 | 1.7 | 5.3 |
| 1981..... | 122,178 | 97,576 | 6.69 | 193.1 | 143.3 | 1.6 | 5.2 |
| 1982..... | 124,589 | 105,853 | 7.31 | 209.5 | 162.9 | 1.5 | 5.5 |
| 1983..... | 124,689 | 110,070 | 7.35 | 217.8 | 179.8 | 1.4 | 5.8 |
| 1984..... | 132,125 | 120,899 | 7.21 | 239.2 | 186.6 | 1.4 | 5.5 |
| 1985..... | 133,833 | 126,101 | 7.32 | 249.5 | 194.7 | 1.3 | 5.5 |
| 1986..... | 141,569 | 136,999 | 6.93 | 271.1 | 202.4 | 1.3 | 5.3 |
| 1987..... | 145,990 | 145,990 | 6.73 | 288.9 | 213.3 | 1.2 | 5.2 |
| Eastern Europe: | | | | | | | |
| 1975..... | 751,413 | 377,941 | ..... | 100.0 | 100.0 | 3.0 | 6.7 |
| 1976..... | 775,447 | 415,065 | ..... | 109.8 | 105.1 | 2.9 | 6.4 |
| 1977..... | 797,308 | 455,217 | ..... | 120.4 | 114.4 | 2.9 | 6.4 |
| 1978..... | 819,897 | 502,248 | ..... | 132.9 | 123.5 | 2.9 | 6.2 |
| 1979..... | 827,506 | 551,905 | ..... | 146.0 | 134.0 | 2.9 | 6.2 |
| 1980..... | 824,883 | 600,616 | ..... | 158.9 | 149.2 | 2.9 | 6.3 |
| 1981..... | 816,946 | 652,446 | ..... | 172.6 | 164.1 | 2.9 | 6.4 |
| 1982..... | 823,793 | 699,909 | ..... | 185.2 | 189.6 | 2.9 | 6.9 |
| 1983..... | 838,232 | 739,952 | ..... | 195.8 | 198.5 | 2.9 | 6.8 |
| 1984..... | 868,471 | 794,684 | ..... | 210.3 | 210.3 | 2.9 | 6.7 |
| 1985..... | 874,783 | 824,243 | ..... | 218.1 | 221.6 | 2.9 | 6.8 |
| 1986..... | 900,636 | 871,558 | ..... | 230.6 | 232.3 | 2.9 | 6.8 |
| 1987..... | 906,142 | 906,142 | ..... | 239.8 | 242.7 | 2.9 | 6.8 |

The estimates of personnel costs in current dollars rely on direct valuation of the cost of the services of the officers and enlisted men entirely in terms of U.S. cash pay rates, including allowances, retirement accruals, and similar benefits. The coverage thus is conceptually more or less comparable to our domestic price estimates of personnel costs with the addition of the extra-budgetary allowances and pensions. Military subsistence (cost of food and clothing) is included in the compensation of officers and enlisted men used for these dollar valuations.

We assumed that the percentage of officers in total military personnel was roughly the same as in the United States for 1965-70, or about 12 percent on the average.³ We use this average for the East European countries for 1975-87. It may be noted that this ostensibly differs from the procedure in Section I where, for calculating the cost of military personnel in domestic currencies, we put

³ See U.S. Department of Commerce, *Statistical Abstract of the United States, 1971*, p. 252. In the United States the percentage of officers increased to an average of 14 percent for the 1971-77 period; see *ibid.*, 1973, p. 379.

the number of officers at about 20 percent of the total military personnel. This larger share was assumed to include lower grade officers.

The conversion of military expenditures from national currencies into current dollars is a very difficult task, given the lack of information on prices of military items and composition of military procurements in East European countries. Proper conversion, indeed, would require information on the composition of the forces, the quantity, quality and technical characteristics of the various military items purchased in each year, and the value weights in the national currencies and in dollars. This study offers a simplified approach to the problem based on implicit conversion rates for GNP derived from comparisons of dollar estimates of GNP and domestic currency estimates of GNP, both given in current prices. All the conversion rates used, it should be said, rest on approximate methods and accordingly should be interpreted with caution.

For this study, the GNP dollar figures were first derived in 1975 dollars for 1975 and moved to other years by our GNP real growth indexes and the U.S. GNP implicit price deflator.⁴ For each country the GNP values in current market prices in the respective national currencies were estimated as follows: Independent estimates of GNP at factor cost were made at our Research Project for Bulgaria for 1975, Czechoslovakia for 1977, the GDR for 1975, Hungary for 1976, Poland for 1977, and Romania for 1977. On the basis of the ratios between GNP and official national income (material product) for these benchmark years, we expanded the official national series to the GNP concept for all the years covered in this study.

Our conversion rates (Table 3, col. 3) implicitly given by comparisons of aggregates in national currencies and in dollars are far from ideal. They reflect the roughness of the basic estimates, and relatively recent estimates of purchasing power parities. Some work in this field has been done among the East European countries themselves, but very few results have been published. Joint efforts by the United Nations, the World Bank, and the University of Pennsylvania in the U.N. International Comparison Project (ICP) have produced studies in purchasing power parity conversion rates for many countries, including Hungary, Poland, Romania, and Yugoslavia.⁵ Unfortunately, the U.N. study does not give separate conversion rates for military end items.

In the present study, we note a revision of our earlier dollar estimates of military expenditures. These new dollar estimates in part reflect the revision of our dollar GNP's for the East European countries (*OP-100*, Table 16)⁶ and a consequent change of the implicit conversion rates of East European domestic currencies into dollars. The present revision takes account of the U.N. International Comparisons Project (ICP) for international dollars for 1975. For Bulgaria, Czechoslovakia, and the GDR the 1975 per capita values

⁴ For details on method see Research Project on National Income in East Central Europe, *Economic Growth in Eastern Europe, 1970, and 1975-87*, Occasional Paper No. 100 (*OP-100*), New York, 1988, pp. 24-25.

⁵ Irving B. Kravis, Alan Heston, and Robert Summers, *World Product and Income: International Comparisons of Real Gross Product*, Baltimore, Johns Hopkins Press, 1982, pp. 178, 260.

⁶ Reference for *OP-100* is found in footnote 4.

were estimated beginning with the ICP estimates.⁷ Our conversion rates were applied to the nonpersonnel component of military outlays in domestic currencies to obtain the current dollar estimates in Table 2, col. 3.

In Table 2, columns 4 to 6 we also present our estimates of total military expenditures, personnel costs, and nonpersonnel costs in constant U.S. dollars of 1987. These were calculated by applying the U.S. GNP implicit price deflator to personnel costs and nonpersonnel costs outlays alike. Reservations may be expressed as to the appropriateness of applying the overall U.S. GNP deflator to both personnel costs and nonpersonnel costs as well. The rough results, however, may provide some orientation as to real changes. Reservations are also noted in our use of overall GNP conversion rates in the field of military procurements, but here, too, the dollar values may be of some interest.

The relative importance of military expenditures may be shown in percentage of total GNP. Comparisons based on such shares would be meaningful if the bases of valuation of the defense and nondefense (civilian) components of GNP's of the various countries are more or less uniform. However, in the East European centrally planned economies, expenditures on civilian consumption goods and services overall are affected by turnover taxes, profits levies, and subsidies, which may be offset in substantial degree, but prices of military hardware and other procurement items are generally exempt from turnover taxes and very probably are heavily subsidized through financial transfers at the state budget or lower levels. These pricing policies imply substantial underestimation of the "real" cost of military spending when expressed as a percentage of GNP based on domestic valuations. (See Table 3, col. 6.) Our dollar estimates, for which the conversion procedures attempt to "bypass" domestic price structures, yield uniformly higher shares of GNP. (See Table 3, col. 7.)

III. FINDINGS

The findings in Tables 1-3 are summarized in Tables 4 and 5 in terms of growth rates for three subperiods. Among the many aspects of our results, we may note the following:

(1) The implicit conversion rates between East European domestic currencies and the U.S. dollar decreased in all countries since 1975 except for Hungary and Poland, where the officially accepted rates of inflation were higher than in the United States.

(2) Military expenditures expressed as percentages of GNP are substantially lower in domestic currencies than in current dollars (compare cols. 6 and 7, Table 3), because of (a) very low nominal pay rates in Eastern Europe for enlisted men (a small portion of their opportunity costs), and (b) price distortion, caused by uneven incidence of turnover and profit taxes, and various forms of subsidies, so that defense expenditures by comparison are priced low. The shares of military expenditures as percentages of GNP on other bases of valuation, e.g., at opportunity costs, factor cost, or world market prices, would be higher than official figures suggest.

⁷ For detailed estimating procedure see *OP-100*, sources to Table 16.

Thus, these percentage shares of GNP in domestic currencies of East European economies are very misleading for comparisons with other countries where such extreme valuation abnormalities do not occur (e.g., Western Europe, U.S.A., and Canada).

(3) Our rough estimates based on dollar valuations of personnel costs and conversion of other defense outlays components at implicit GNP overall rates indicates that the percentage share of GNP spent on defense in Eastern Europe as a whole is more than double the corresponding percentage of GNP calculated in domestic currencies. (See Table 3.)

(4) Based on valuation in dollars (see Table 5), defense spending for the whole of Eastern Europe shows slow growth in 1975-80 relative to the rate of increase in GNP. But in the 1980-85 period, military expenditures grew twice as fast as GNP in Eastern Europe, and only in the latest period, 1986-87, have growth rates of military outlays and GNP become similar.

(5) Before 1980 and after 1985 in many individual countries and for Eastern Europe as a whole, the nonpersonnel and R&D outlays grew at higher rates than personnel costs.

(6) In domestic currencies, both in current and constant prices (see Table 4), the difference between rates of growth for personnel and nonpersonnel outlays is somewhat smaller, and in some cases personnel outlays grew faster than other military costs.

TABLE 4.—AVERAGE ANNUAL PERCENTAGE RATES OF CHANGE IN DOMESTIC CURRENCY ESTIMATES OF DEFENSE EXPENDITURES, FOR EAST EUROPEAN COUNTRIES, 1975-87

| Country and year | [In percent] | | | | | |
|--|-------------------|-----------------|--------------------|--------------------|-----------------|--------------------|
| | In current prices | | | In constant prices | | |
| | Total | Personnel costs | Nonpersonnel costs | Total | Personnel costs | Nonpersonnel costs |
| (1) | (2) | (3) | (4) | (5) | (6) | |
| Bulgaria: In current leva; in 1975 leva: | | | | | | |
| 1975-80..... | 8.4 | 5.4 | 10.5 | -2.2 | -0.6 | -3.7 |
| 1980-85..... | 4.2 | 3.1 | 4.9 | -5 | .4 | -1.5 |
| 1986-87..... | 5.2 | 4.2 | 5.9 | -2.2 | 2.4 | -5.7 |
| Czechoslovakia: In current crowns; in 1977 crowns: | | | | | | |
| 1975-80..... | 2.9 | 4.1 | 2.4 | 0.9 | 1.7 | .5 |
| 1980-85..... | 3.9 | 3.8 | 3.9 | 0.7 | 2.1 | .0 |
| 1986-87..... | 5.2 | 3.3 | 6.0 | NA | NA | NA |
| German Democratic Republic: In current marks; in 1975 marks: | | | | | | |
| 1975-80..... | 5.2 | 3.6 | 5.9 | 2.7 | 1.7 | 3.2 |
| 1980-85..... | 6.1 | 3.0 | 7.1 | -3.1 | 1.5 | -5.0 |
| 1986-87..... | 7.3 | 3.7 | 8.3 | 3.9 | 2.1 | 4.8 |
| Hungary: In current forints; in 1976 forints: | | | | | | |
| 1975-80..... | 9.3 | 7.5 | 10.0 | 3.5 | 1.3 | 4.5 |
| 1980-85..... | 6.2 | 7.4 | 5.7 | -1.3 | -2 | -1.8 |
| 1986-87..... | 8.5 | 8.2 | 8.6 | 2.3 | .0 | 3.3 |
| Poland: In current zlotys; in 1977 zlotys; | | | | | | |
| 1975-80..... | 7.3 | 11.8 | 5.7 | 1.3 | 2.4 | 1.0 |
| 1980-85..... | 36.3 | 31.2 | 38.5 | -1.3 | -6 | -1.5 |
| 1986-87..... | 21.6 | 22.0 | 21.5 | -5.8 | -2.8 | -6.8 |
| Romania: In current lei; in 1977 lei: | | | | | | |
| 1975-80..... | 2.8 | 5.6 | 1.0 | .2 | 1.9 | -.9 |
| 1980-85..... | 3.9 | 7.7 | .7 | -2.3 | 1.2 | -5.0 |
| 1986-87..... | -9 | 5.6 | -7.7 | -1.9 | 5.6 | -8.4 |

Sources: Calculated from Table 1. Five-year rates are calculated by least squares fit to $I_n = I_0 (1+R)^n$. 1986-87 rates are simple averages.

TABLE 5.—AVERAGE ANNUAL PERCENTAGE RATES OF CHANGE IN GNP AND DEFENSE EXPENDITURES FOR EAST EUROPEAN COUNTRIES, 1975-87

[Calculated from data in constant 1987 and current dollars]

| Country and period | GNP | | Defense expenditures | | | | | |
|------------------------------------|-----------------------|-----------------|----------------------|-----------------|----------------------------|-----------------|-----------------|----------------------------|
| | Constant 1987 dollars | Current dollars | In current dollars | | | In 1987 dollars | | |
| | | | Total | Personnel costs | Nonpersonnel and R&D costs | Total | Personnel costs | Nonpersonnel and R&D costs |
| Bulgaria: | | | | | | | | |
| 1975-80..... | 1.2 | 8.9 | 7.9 | 6.6 | 12.6 | 0.2 | -0.9 | 4.6 |
| 1980-85..... | .9 | 6.0 | 7.3 | 7.6 | 6.6 | 2.1 | 2.3 | 1.4 |
| 1986-87..... | 2.8 | 5.9 | 4.6 | 4.1 | 6.5 | 1.6 | 1.0 | 3.4 |
| Czechoslovakia: | | | | | | | | |
| 1975-80..... | 2.2 | 10.0 | 8.4 | 8.0 | 8.8 | .7 | .3 | 1.1 |
| 1980-85..... | 1.4 | 6.6 | 8.6 | 9.5 | 7.3 | 3.3 | 4.2 | 2.1 |
| 1986-87..... | 1.7 | 4.8 | 6.5 | 4.9 | 8.7 | 3.3 | 1.8 | 5.5 |
| German Democratic Republic: | | | | | | | | |
| 1975-80..... | 2.4 | 10.2 | 8.9 | 7.2 | 10.6 | 1.2 | -.4 | 2.7 |
| 1980-85..... | 1.7 | 6.9 | 8.9 | 8.7 | 9.1 | 3.6 | 3.4 | 3.9 |
| 1986-87..... | 1.9 | 4.9 | 6.6 | 3.4 | 9.4 | 3.5 | .4 | 6.2 |
| Hungary: | | | | | | | | |
| 1975-80..... | 2.3 | 10.1 | 8.3 | 6.9 | 11.2 | .6 | -.7 | 3.3 |
| 1980-85..... | .9 | 6.0 | 5.7 | 6.7 | 3.6 | .6 | 1.6 | -1.4 |
| 1986-87..... | 1.7 | 4.7 | 3.6 | 3.2 | 4.7 | .6 | .1 | 1.7 |
| Poland: | | | | | | | | |
| 1975-80..... | .9 | 8.6 | 9.2 | 10.8 | 6.8 | 1.5 | 2.9 | -.8 |
| 1980-85..... | 1.2 | 6.4 | 8.5 | 8.9 | 7.7 | 3.3 | 3.7 | 2.5 |
| 1986-87..... | .2 | 3.2 | 2.5 | 3.9 | -.1 | -.5 | .9 | -3.0 |
| Romania: | | | | | | | | |
| 1975-80..... | 3.9 | 11.8 | 6.0 | 6.2 | 5.5 | -1.5 | -1.4 | -2.0 |
| 1980-85..... | 2.0 | 7.2 | 8.4 | 10.3 | -.6 | 3.1 | 5.0 | -5.4 |
| 1980-87..... | 4.5 | 7.6 | 4.7 | 6.0 | -3.6 | 1.6 | 2.9 | -6.4 |
| Eastern Europe: | | | | | | | | |
| 1975-80..... | 2.0 | 9.8 | 8.4 | 8.1 | 8.8 | .7 | .4 | 1.1 |
| 1980-85..... | 1.4 | 6.6 | 8.2 | 8.8 | 7.2 | 3.0 | 3.6 | 2.0 |
| 1986-87..... | 1.8 | 4.9 | 4.7 | 4.3 | 5.3 | 1.6 | 1.2 | 2.2 |
| USSR: | | | | | | | | |
| 1975-80..... | 1.3 | 8.7 | 9.8 | | | | | |
| 1980-85..... | 1.9 | 7.2 | 8.0 | | | | | |
| 1986-87..... | | | | | | | | |
| United States: | | | | | | | | |
| 1975-80..... | 3.7 | 11.3 | 9.1 | 6.4 | 10.4 | 1.3 | -.4 | 2.5 |
| 1980-85..... | 2.5 | 7.8 | 13.5 | 10.6 | 15.2 | 6.9 | 2.0 | 10.0 |
| 1986-87..... | 3.3 | 6.2 | 5.7 | 2.2 | 6.7 | 3.0 | 1.2 | 4.0 |

IV. CONCLUSIONS AND PROBLEMS

The preliminary findings on defense expenditures of East European countries in national currencies and in U.S. dollars offered in this paper are very tentative and very narrowly defined. They are based primarily on officially published budgets of the respective

ministries of defense. Some additions were made toward a more comprehensive measure of defense expenditures in Eastern European to make them more in accord with the definitions and coverage applied for the United States and other Western countries.

The coverage of our East European personnel cost estimates is now more nearly comparable internationally than in our earlier estimates, as we have added rough approximations of benefits and pensions financed from sources outside the defense budgets. A token adjustment in the direction of broader coverage was made by a small, very roughly estimated allowance for military R&D in Czechoslovakia, the GDR, and Poland. These three countries are known to be developing and producing certain armaments for the Warsaw Pact countries. Beyond this R&D allowance, however, no attempt has been made to include military-related nonpersonnel expenditures known to be financed outside the defense budgets proper, and not identified as defense outlays in the official statistics. The omitted items of military expenditures financed partly or fully by ministries and agencies other than the ministries of defense in East European countries were discussed by the authors at some length in earlier papers.⁸ To provide sound estimates of the more important military expenditures not included in official East European budgets would require a large, sustained research effort, tracing in detail the intricacies of fiscal and other financial flows in the economies of Eastern Europe.

For the time being, the present study provides a picture of the extent, allocation, and trends of defense expenditures in Eastern Europe largely within the confines of the incomplete coverage reflected in the official defense budgets. Our constant price estimates shed some new light on aspects of measuring changes in real magnitudes. Despite the limited coverage of the available information, it is clear that the military effort of the six East European countries covered in this study is indeed substantial. Their estimated number of regular, active forces amounts to more than one-half of that of the United States. Even in terms of the narrowly defined official defense budgets, their estimated military expenditures as a group amount to more than one-fifth of the total defense outlays of the United States in terms of U.S. dollars.⁹

⁸ U.S. Congress, Joint Economic Committees, *East European Economies: Slow Growth in the 1980's*, Vol. 1, 1985, pp. 493-495.

⁹ Table 2, above; *Statistical Abstract of the United States, 1988*, p. 314.

COMMENT*

By Keith Crane**

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I. INTRODUCTION

The papers in this section examine Eastern European economic inputs into defense (Deutch), trends in defense budgets (Alton), military outputs (Bielli), and intraregional patterns of military inputs and outputs (Nelson). They all chart (with the exception of some of Alton's indices), declines in Eastern Europe's contribution to the Warsaw Pact: arms industries are not being modernized, budgets are declining in real terms, procurement of new weapons systems has been slow, and East European military commitments continue to be far less than those of the Soviets, even accounting for differences in status and size.

This comment examines the decline of Eastern Europe's military commitment to the Warsaw Pact in the context of these papers. It first discusses how we know what we know, i.e., sources of information on the economic side of East European military efforts. It then compares several indicators and what they imply about trends in military spending and force modernization. The paper proceeds to assess constraints on military modernization imposed by demographic, social, and economic trends in Eastern Europe and to suggest why East European governments have announced such sharp reductions in military budgets in 1989. The comment concludes with a discussion of the policies Western countries could adopt to influence East European government decisions on allocations to the military.

II. MEASURES OF MILITARY INPUTS AND OUTPUTS

When Western defense analysts examine the East European militaries their primary concern is the threat these establishments pose for NATO forces. They attempt to determine the numbers and capabilities of Warsaw Pact forces, the morale and training levels of troops, and the tactics and doctrine of Warsaw Pact forces. The

*Views expressed in this paper are the author's own and are not necessarily shared by Rand or its research sponsors.

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primary concern of economists who examine these militaries is: How much do these forces cost and what are the East Europeans purchasing with their military expenditures?

These papers incorporate three economic measures of military effort. The first are dollar estimates of the cost of replicating the East European militaries using U.S. factor costs. This method answers the question, "How much would it cost the United States to field forces identical to those fielded by the East Europeans?" They are constructed by valuing East European personnel, procurement, research and development, operating and maintenance, and other costs using U.S. prices. The resulting dollar estimates can be used to compare levels of effort across countries or to measure real increases in military spending (in U.S. prices), as Bielli does for military procurement and Alton for personnel. They provide a crude measure of what the East Europeans are doing relative to the United States and other countries.

A second measure is building block estimates in domestic currencies. Dollar cost estimates tell us nothing about the opportunity cost of the East European militaries to their domestic economies because East European and U.S. price systems are so different. For example, a large portion of dollar cost estimates is composed of personnel costs because East European armies are relatively large and U.S. salaries are relatively high. East European soldiers would not, however, earn anything close to U.S. salaries, if employed in the civilian economy. Their true opportunity cost is the wages they would earn in their own country, not what U.S. servicemen make. Alton's dollar estimates reflect these differences: personnel costs run up to 70 percent of his dollar cost estimates; in domestic prices they run 30 percent or less (except for Romania).

Building block estimates in domestic currencies are constructed in the same way dollar cost estimates are. Physical units such as tanks purchased, fuel consumed or soldiers fielded are valued using domestic prices. The resulting total is the cost of the country's military in its own currency. These figures reflect the costs that East European policymakers must confront when putting together national budgets and economic plans. Although of little use to military planners, they provide a means to size the burden of military spending. They also make it possible to assess tradeoffs between increases in military spending and increases in alternative expenditures such as investment and social spending.

Clements provided building block estimates in domestic currencies in the last Joint Economic Committee volume.¹ He found expenditures by Eastern Europe increased at an average annual rate of 7 percent in nominal terms and 2 percent in real terms in the 1970's. Bielli notes that no current domestic building block estimates are available.

A third set of measures are the military expenditures reported by the East European statistical authorities. Alton notes that reported Soviet expenditures exclude major components of military spending such as military procurement and research and develop-

¹ Thomas W. Clements, "The Costs of Defense in the Warsaw Pact: A Historical Perspective," in Joint Economic Committee, *East European Economies: Slow Growth in the 1980's*, Vol. 1, Washington, DC, 1985.

ment and argues the East European budgets also probably understate actual spending. Clements finds reported expenditures were close, but not identical to his building block estimates; building block estimates averaged 15 percent more than the reported expenditures in the 1970's. Part of the discrepancy is due to differences in coverage. For example, military research and development probably is not covered out of the defense budgets.

Despite their flaws, the reported military budgets are the instruments used by East European leaders to channel resources to the military and make tradeoffs between military spending and other budget items. What little debate heard from Eastern Europe on the military generally focuses on the budget. In 1988 members of Hungary's Parliament called on the finance minister to defend the size of the budget. In Poland criticism of the military and debate over its role has also frequently centered on the budget.

A related measure is estimates of military expenditures constructed from residuals found in national income accounting and other economic data. Some of these reconstructions indicate that the reported budgets cover the major components of military spending: personnel, operations and maintenance, and procurement costs.² On average Crane's reconstructions remained within 10 percent of the reported budgets.

Some of these measures are more reliable than others. The dollar building block estimates for procurement are based on intelligence counts of additions to East European armories. The prices used to value these weapons are estimated by U.S. manufacturers. Because the intelligence agencies need to make accurate counts of major, new weapons and because they have their own set of prices, one would expect the constant dollar series for military procurement to be quite reliable.

Building block estimates in domestic prices are also probably fairly reliable, although the prices employed for military equipment may be of variable quality.

As noted above, there is an appreciable amount of evidence indicating that military expenditures as reported by the East European governments cover the major components of military spending: personnel, operations and support, and procurement. Changes in the ratio of these budgets to net material product or utilized national income (UNI, the material goods available for consumption and investment), are probably good indicators of changes in the importance given defense.

Deflating these budgets is a more dubious proposition. For example, Alton's deflated dollar estimates of East German nonpersonnel costs increased 36 percent between 1980 and 1987; his estimates in constant East marks show a decline of 11 percent for the same period. The choice of a deflator has an enormous effect on the result.

² Keith Crane, *Military Spending in Eastern Europe*, The RAND Corp., Santa Monica, CA, R-3444-USDP, May 1987.

III. DECLINES IN MILITARY SPENDING

Although none of these measures is perfect, used in conjunction with each other they indicate changes in the importance and priorities given the military. They show, with the exception of Alton's dollar estimates for the GDR, that in constant prices military spending in Eastern Europe generally stagnated or even declined in the 1980's.

Although nominal budget increases kept pace with reported inflation through much of the 1980's, cuts in military spending in real terms have been announced for 1988 and 1989. After some acrimonious debates in the Hungarian Parliament in 1987, the 1988 military budget emerged unscathed. However, a 17-percent reduction in military spending in real terms was announced for 1989; procurement is to be more than halved.³ The Polish Government has also announced that military expenditures will be cut by 4 percent in real terms in 1989. The East Germans have also reduced increases in the military budget from over 6 percent per year between 1980 and 1987 to 3.4 percent for 1988 and 1989 and have announced a 10-percent cut for 1990. Bulgaria and Czechoslovakia have also announced 12 and 15 percent reductions in military spending, respectively.

Other indicators also reflect stagnation. Military modernization programs have proceeded slowly (Bielli). Deutch notes that the East Europeans have starved parts of their armaments industries of investment. Personnel numbers have stagnated. Times have been tough for the East European militaries.

The slowdown in military modernization has been noticeable in the widening gaps between the capabilities of Soviet forces stationed in Eastern Europe and the national forces of the East European countries. As noted by Bielli, the Polish army continues to field large numbers of World War II vintage towed artillery, none of which approaches Soviet standards of modern self-propelled artillery, an essential component of the armament needed for rapid maneuver. All the armies rely on the T-54/55 as their main battle tanks, although some are beginning to deploy the T-72. The T-54/55 is three generations behind the T-80, the Soviets' main battle tank; even the T-72 is a full generation behind the T-80. There is also a growing disparity between Soviet and non-Soviet Warsaw Pact air forces.

IV. WHY ARE MILITARY EXPENDITURES BEING REDUCED?

All the East European countries have found the 1980's to be a decade of recession. Although Poland's depression was the most spectacular, with UNI declining by a quarter between 1978 and 1982, in the early 1980's UNI in Czechoslovakia, the GDR, and Hungary declined by 5, 4, and 6 percent, respectively, in comparison with the beginning of the decade. For some countries, most notably the GDR, Hungary, and Poland, the declines in UNI can be traced to problems in servicing their hard currency debt. Substan-

³ "Karpatis Speaks for Defense Ministry," Foreign Broadcast Information Service, FBIS-EEU-88-237, Dec. 9, 1988, p. 24.

tial increases in the price of Soviet oil also weighed heavily on all of Eastern Europe.

Eastern Europe has also paid a price for the rigidities of the economic systems. During the 1980's economic policymakers have made belated attempts to restructure their economies, but with little success. Czechoslovakia, a country little burdened by debt, has experienced its slowest growth rates since the end of World War II. Despite favorable economic conditions (declining prices of Soviet oil, a more manageable hard currency debt), growth in the GDR has been decelerating. Romania has almost succeeded in paying off its hard currency debt, but has experienced no concomitant upswing in domestic consumption.

Not surprisingly, economic hardship has affected the military. The East European military press has placed much greater emphasis on conserving fuel and equipment, to some extent at the expense of training. The military has also been encouraged to become more self-sufficient; at many posts soldiers grow some of their own food.

Demographic constraints in Hungary, Czechoslovakia, the GDR are also affecting the military. The GDR is confronting a shortage of up to 16,000 recruits in 1992: 10 percent of its current force levels partly explaining the recent announcement of a 10,000 man cut in forces.⁴ Hungary has recently begun to restructure its forces into brigades from divisions.⁵ This may have been caused in part by demographic constraints.

In the past the East Europeans have not bridled at increasing military spending, even in times of economic austerity. The GDR doubled military spending in 5 years during the 1960's. The Poles and Czechs increased spending while maintaining enormous investment drives during the early 1950's; consumers suffered the economic consequences. The current unwillingness to increase military spending is due to political factors.

The political rationales for reducing military spending are as diverse as the political systems of these countries. Romania, the country which appears to have reduced its military expenditures the most (Alton et al.), is run by Nicolae Ceaucescu, a diehard Stalinist. Romania has reduced expenditures for economic reasons, but also because of Ceaucescu's policies of minimizing Romania's contribution to the Warsaw Pact. The Romanian armed forces now concentrate on territorial defense.

Hungary, which has been reducing expenditures in real terms during the 1980's, made its sharpest cuts in the 1989 budget. The Hungarian defense minister cites Hungary's economic problems as cause for the reductions, but he has also elaborated at length on the withdrawal of Soviet troops from Hungary. The Hungarians will not be replacing these forces with their own. The Soviet Union's willingness to reduce its own troops appears to have encouraged the Hungarians to do the same. The key factor in Hungary's reductions, however, has probably been the political liberaliza-

⁴ Estimated from demographic projections by the Center for International Research, U.S. Department of Commerce, and force data from the *The Military Balance*, International Institute for Strategic Studies, London, 1987.

⁵ *The Military Balance*, International Institute for Strategic Studies, London, 1988.

tion which caught fire in 1988. The election of Rezsó Nyers to the Politburo meant that a critic of the secrecy and size of past military expenditures was selected to the preeminent policymaking body. The reform current within the Hungarian Socialist Workers' Party and the addition of a host of new political organizations and parties outside it have created a strong constituency skeptical of the need for increased military spending. Their preferences have been reflected in the 1989 budget.

Pressures in Poland to reduce the government budget deficit have contributed to the decision to reduce the 1989 budget and consolidate forces. The Polish defense minister has announced that 15,000 soldiers have been cut and older generation tanks, artillery, and airplanes withdrawn in the past 2 years.⁶ The GDR also appears to have decided to reduce its military budget for reasons of economy. Political pressures played a role: During an era of better East-West relations support for the military has waned.

In the past Soviet policy has pushed the East Europeans to increase military spending, although without great success. As noted by Bielli, the East Europeans response to the 1978 Soviet demand for increased military spending was unenthusiastic. With the exception of the GDR and possibly Bulgaria Soviet demands appear to have gone unfulfilled.

Gorbachev's speech to the United Nations has now created an entirely new situation. If he fulfills his promise to withdraw six divisions, 5,000 tanks, and 50,000 men from Eastern Europe, pressures to reduce military forces in Eastern Europe will grow stronger. His January 18, 1989, announcement of a 14-percent reduction in Soviet military spending will make it extremely difficult for the East European militaries to lobby for increased expenditures. A major source of pressure for increased military spending has disappeared.

V. WESTERN POLICIES AND MILITARY SPENDING IN EASTERN EUROPE

For economic and security reasons, Western policymakers have a strong interest in the decline in Eastern European military expenditures. What can policymakers do to encourage such a trend?

Western policymakers can probably have the greatest impact on East European military expenditure decisions by providing information. By informing East European publics and policymakers about NATO, U.S., and Soviet military doctrines, procurement policies and their rationales, Eastern European publics and elites will be better able to conduct informed policy debates on optimal levels of military spending. The current lack of information about military budgets, even among East European policymakers, is so great that informed debates, even in the parliaments, are almost impossible.⁷ Dissemination could occur at both the elite level through foreign ministry and, possibly, defense ministry visits and at the mass level through Western radio broadcasts to Eastern Europe.

Western policymakers could also influence the East European policy debate by voicing their concern over the size and opacity of

⁶ "Siwicki Interviewed on Changes in Army," FBIS-EEU-89-002, Jan. 4, 1989, p. 36.

⁷ Hungarian parliamentarians were given 15 minutes to review the recent defense budget before they were asked to approve it.

the East European budgets. As conventional arms control talks begin, it would behoove Western policymakers to argue for the release of information on the composition of East European military expenditures, as well as the composition of the armed forces. This information would help flag changes in emphasis on training and procurement which would otherwise be missed. It would also help build confidence and increase the credibility of Warsaw Pact arms control proposals and the probability a treaty will be signed.

IV. AGRICULTURE

OVERVIEW

By John P. Hardt* and Sheila N. Heslin**

INTRODUCTION

The countries of Eastern Europe have, since the early 1980's, sought to improve agricultural performance to meet the medium-term goal of agricultural self-sufficiency and the long-term goal of producing a new source of hard-currency export income. The papers in this section examine East European agricultural reform (Cochrane and Lambert); performance trends in individual countries and in the region as a whole (Lazarcik); and the structural impediments to comprehensive agricultural reform (Boyd). Meeting the interdependent but sometimes conflicting challenges of domestic economic reform while maintaining a fundamentally unchanged social, economic, and political framework has led East European policymakers to devise several approaches to agricultural reform. The authors conclude that those countries which have undertaken the most comprehensive reform programs have also shown the most progress toward meeting their stated goal of food self-sufficiency.

IMPETUS TO AGRICULTURAL REFORM

During the 1970's, the countries of Eastern Europe were able to achieve impressive gains in consumption and living standards, despite the inefficiencies of centrally planned agriculture. Cochrane and Lambert explain that official government policies, including rapid modernization and augmentation of domestic standards of living, effectively undercut the agricultural sector. Investment resources were concentrated on the development of industry. At the same time, industrial prices were allowed to appreciate while agricultural prices were kept artificially low, which undermined the profitability of collective and individual farms and necessitating large government subsidies. In addition, many rural dwellers migrated to the cities as improvement in urban living standards were subsidized at the expense of farmers. These policies were based on the assumption that import-led growth, financed by cheap credits, would enable the countries to export high value-added goods on world markets, finance future repayment of credit, and continue

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up the development ladder while less developed countries took over the production of agricultural products and low-technology output.

By the early 1980's, the East European nations had become net agricultural importers, dependent on hard currency Western grain imports. When Western creditors stopped extending new credits and interest rates on large outstanding loans increased, East European countries were faced with the prospect of paying for essential imports and debt service with exports from industrial sectors that were not yet sufficiently competitive to maintain their already inadequate Western market shares. In response to the deteriorating situation, write Cochrane and Lambert, "The countries of Eastern Europe abruptly initiated policies of self-sufficiency in grain production in order to reduce import needs, and the region's net grain imports fell from an average of 12.2 million tons during 1976-80 to 5.9 million tons during 1981-85." The cutbacks dramatically affected Eastern Europe's meat consumption, as livestock production stagnated throughout the region and, in Poland, dropped precipitously.

In the early 1980's, all of the East European countries faced the same difficulties: a shortfall of hard currency, severely reduced agricultural imports, a squeeze on investment resources, and stagnating standards of living. Forced to reexamine past policies, decision-makers concluded that as a region, Eastern Europe had a comparative advantage in agricultural production. In fact, Eastern Europe's leaders believed that they had the potential to supply their own needs in most foods and, eventually, most countries could even become overall net exporters of agricultural products. Agricultural reform, it was hoped, would enable East Europeans to meet the primary goals of increasing food output and net food self-sufficiency while decreasing state subsidies to farms. Further, this was to be accomplished in an era of rising costs and in an economy with a poorly developed infrastructure, low-labor productivity, and reduced rural labor resources.

East European leaders responded to the findings by adopting a full range of agricultural reform programs. The East German leadership, embracing the most conservative approach, designed reform to meet the dual goals of increasing efficiency and output without changing the political, economic, or social structure of the traditional centrally planned economy. In the German Democratic Republic, explains Boyd, reform efforts centered on improving "informational and directional flows by increasing the size of enterprises and linking them directly to processing industries"—ergo, the *Kombinate*.

In contrast to the German Democratic Republic, the more "progressive" reformers, including Hungary, Yugoslavia, and Bulgaria, made efforts to increase efficiency and output by altering the traditional centrally planned politico-economic model. The new approach was to focus on increasing individual incentives by relating rewards more directly to individual effort, both in the socialized and private sectors. A second focus was placed on increasing individual initiative and innovation through the decentralization of decisionmaking. Cochrane and Lambert further distinguish between the progressive reformers, noting that the most progressive announced significant departures from traditional central planning

and socialized ownership, in favor of a greater role for market forces.

PERFORMANCE

East European nations have been successful in attaining increased efficiency and productivity in the agricultural sector over the past 8 years. Reform efforts, argue Lazarcik, Cochrane, and Lambert, have resulted in higher yields of grain, meat, fruits, and vegetables. Specifically, the increased output may be attributed to a greater emphasis on profit incentives, particularly with regard to private agriculture. Lazarcik, for example, projects that, "If the recent incentive policies conducive to increasing agricultural output and productivity continue unabated in the future, Eastern Europe as a whole could become self-sufficient in agricultural production in the 1990s." Certainly, the higher grain yields and meat production achieved in the 1980's offer an optimistic future outlook, and a glimpse of Eastern Europe's potential as a net grain exporter.

Notwithstanding the notable improvements in per capita agricultural output throughout the region, intersectoral performance (private versus socialized), has been uneven. Growth in gross agricultural output in the private sector, note Cochrane and Lambert, consistently outpaced that of the socialized sector, despite a clear government bias in allocating resources and investment funds to the latter. Performance also varied significantly from country to country. Lazarcik found that while the region as a whole experienced 9 percent growth, Romania, Yugoslavia, Hungary, Czechoslovakia, and the GDR all attained above-average growth levels. More specifically, Lazarcik found that in the period from 1975 to 1987, "the greatest increase in farm output occurred in Romania, with an increase of over 40 percent, followed by Czechoslovakia, Yugoslavia, Hungary, GDR, and Bulgaria, in descending order." Poland, on the other hand, showed no increase in output. Despite Eastern Europe's notable progress toward food self-sufficiency in the 1980's, a common consensus among Western scholars has emerged that the results of the reform itself have been mixed.

IMPEDIMENTS TO REFORM

All of the authors conclude that while performance in the agricultural sector has improved, neither the full implementation of agricultural reform nor Eastern Europe's full potential for output has yet been attained. Cochrane and Lambert analyze reform from the perspective of emerging contradictory politico-economic policies which hamper full implementation of reform. In contrast, Boyd evaluates progress based on an interactive politico-economic model and attempts to evaluate the dichotomy between promulgated and implemented reforms.

The absence of a coherent strategy of comprehensive reform, argues Boyd, effectively undermines newly implemented reform policies, as old problems remain and new problems, generated by ineffective decentralization, mount. Boyd contends that further success in reform depends on the development of mutually reinforcing measures in the following critical areas: (1) price determination,

both for inputs and outputs across all sectors; (2) allocation of investment resources both within and between sectors; (3) determination of output levels and mix according to plan and market; and (4) the organization of production units into state collective or private farms. Boyd argues that failure to fully implement one or more of these four inter-related components prevents the reforming country from realizing the potential benefits of comprehensive agricultural reform.

Price determination according to the market forces of supply and demand is a cornerstone of comprehensive reform. Government and party leaders undertaking agricultural reform often hope to eliminate subsidies on consumer goods and to formulate economic policies on objective market criteria through implementation of price reform. Nevertheless, price reform has not been carried out by any of the countries which have undertaken reform. This has been explained as reluctance on the part of party and government leaders who fear the consequences of sharply increased consumer prices which would result from price reform. In the one case where it was tried—Poland—widespread strikes erupted which brought down government leaders in 1970 and again in 1981. In the meantime, failure to implement price reform has allowed bureaucrats, ministry officials and party members (“central planners”) to continue to set prices based on regional or institutional considerations, personal gain, a general misunderstanding of the economy or some combination thereof.

Similarly, although reform reduces the legal justification for microeconomic intervention, since central planners continue to determine pricing, allocation of investment resources and the tax structure (consequently they have a direct effect on profits) they de facto retain central control. For example, Cochrane and Lambert point to the continued diversion of investment resources to state rather than private farms, despite the higher growth and marginal productivity in the private sector farms as evidence of the continuation of misguided central intervention. A common intersectoral bias in favor of the industrial sector despite lower marginal returns on capital investment than those gained in the agricultural sector exemplifies the same.

In the absence of comprehensive reform, bureaucratic control also spills over to determination of the level and structure of output and to the proportion of agricultural production committed by central authorities to the plan. For example, in those countries where central planners lost the legal right to impose state orders,¹ they successfully continue to do so—even though agricultural prices are higher in private markets. Simply put, farmers complied with bureaucratic requests for state orders to gain the “cooperation” of central planners regarding crucial pricing, investment and tax policies. Boyd points out that the price of such “cooperation” has been high: continuation of state orders produced economic dislocations; skewed production according to the narrow regional and

¹ A state order requires farmers to sell produce to the state at administratively set prices rather than in the more profitable market. Central planners or ministries then allocate goods procured through state orders according to the plan.

institutional interests of individual bureaucrats or ministries; and resulted in a net decrease in overall efficiency.

The inconvertibility of East European currencies and the need to balance trade bilaterally on a regional level has further exacerbated production distortions and created regional trade anomalies. For example, as pointed out by Cochrane and Lambert, while Eastern Europe could be self-sufficient with regard to food, Eastern Europe's net agricultural exporters "seek to maximize hard currency earnings by selling outside the region," seemingly without regard to high-input prices and questionable profitability. Paradoxically, Eastern Europe's net agricultural importers, whose aim it is to limit hard currency expenditures, "must look largely to suppliers outside the region to sustain present levels of consumption." In addition, a monopoly on foreign trade continues to be maintained through foreign trade organizations (FTO's) despite their tendency to discourage innovative private farmers from engaging in hard currency export trade and to exacerbate problems of excess import demand.

East European agricultural reformers, note the authors, have been unable to fully meet their first-order objectives of decentralizing decisionmaking or of providing the farmer with market independence and incentives. Second-order objectives such as the reduction of state subsidies and diminishing bureaucratic micromanagement have not yet been attained either. But, despite these catch-22 contradictions of partial reform, all of the authors agree that Eastern Europe's agricultural sector has shown significant growth and that regional output will continue to rise. Moreover, they all predict that the region's prospects for increased agricultural trade in the 1990's is good if not bright. This noted, however, the risks of not fully implementing reform falls on the party and government leaders that, having devised and announced reform with great fanfare but not achieving what had been promised, could face a future crisis of legitimacy at the popular level. Moreover, if the Common Market reduces agricultural barriers as it did in the EC-Hungarian agreement, then West European markets may be more open to East European agricultural exports.

EAST EUROPEAN AGRICULTURE: PRESSURES FOR REFORM IN THE EIGHTIES

By Nancy J. Cochrane and Miles J. Lambert ¹

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SUMMARY AND INTRODUCTION

During the 1970's, the countries of Eastern Europe were able to achieve considerable gains in food consumption and living standards, despite inefficiencies in centrally planned agriculture. These gains were achieved however, only by importing what was needed to make up for domestic shortfalls, especially livestock feedstuffs. With the financial crisis of the early 1980's, imports of the same magnitude were no longer possible. The region's agricultural imports, which totaled \$12 billion in 1981, fell to \$9 billion in 1982. (See table 1.) Particularly severe were the declines in Hungary (\$1,041 million to \$732 million), Poland (\$3,074 million to \$1,852 million), and Romania (\$1,573 million to \$839 million). The countries of Eastern Europe abruptly initiated policies of self-sufficiency in grain production in order to reduce import needs, and the region's net grain imports fell from an average of 12.2 million tons during 1976-80 to 5.9 million during 1981-85. As grain supplies fell, Poland, in particular, severely scaled back its livestock production, and livestock production stagnated elsewhere.

¹ The authors are agricultural economists in the Centrally Planned Economies Branch of the Economic Research Service of the U.S. Department of Agriculture. The authors wish to acknowledge the assistance of Elizabeth Kirkwood, Economic Assistant, CPE Branch, in preparing the tables for this report.

TABLE 1.—EAST EUROPEAN AGRICULTURAL TRADE

| | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia | Total |
|---------------------------------|----------|------------------|----------------------------|---------|-------------------|------------------|------------------|--------|
| MILLIONS OF U.S. DOLLARS | | | | | | | | |
| Agricultural exports: | | | | | | | | |
| 1976-80..... | 1,572 | 462 | 410 | 1,811 | 1,070 | 1,256 | 745 | 7,326 |
| 1981-85..... | 1,716 | 574 | 463 | 2,069 | 797 | 957 | 1,149 | 7,725 |
| Agricultural imports: | | | | | | | | |
| 1976-80..... | 556 | 1,768 | 2,094 | 1,111 | 2,372 | 1,049 | 1,232 | 10,182 |
| 1981-85..... | 837 | 1,749 | 2,152 | 811 | 1,837 | 882 | 1,228 | 9,496 |
| In 1,000 METRIC TONS | | | | | | | | |
| Principle exports total grain: | | | | | | | | |
| 1976-80..... | 429 | 69 | 376 | 1,035 | 35 | 1,577 | 277 | 3,748 |
| 1981-85..... | 597 | 207 | 349 | 1,645 | 183 | 892 | 774 | 4,647 |
| Wheat: | | | | | | | | |
| 1976-80..... | 326 | (¹) | 59 | 682 | (¹)— | 971 | 18 | 2,056 |
| 1981-85..... | 570 | 146 | 85 | 1,363 | (¹)— | 189 | 95 | 2,448 |
| Corn: | | | | | | | | |
| 1976-80..... | 84 | 6 | (¹) | 330 | (¹)— | 602 | 249 | 1,271 |
| 1981-85..... | 19 | 3 | (¹) | 250 | (¹)— | 699 | 668 | 1,639 |
| Meat and meat products: | | | | | | | | |
| 1976-80..... | 108 | (¹) | (¹) | 285 | 156 | 187 | 113 | 849 |
| 1981-85..... | 114 | (¹) | (¹) | 423 | 81 | 173 | 147 | 938 |
| Fresh and preserved vegetables: | | | | | | | | |
| 1976-80..... | 482 | (¹) | 2 | 363 | (¹)— | ² 189 | (¹) | 1,036 |
| 1981-85..... | 410 | (¹) | 7 | 444 | 84 | ² 136 | (¹) | 1,081 |
| Principle imports total grain: | | | | | | | | |
| 1976-80..... | 576 | 1,679 | 3,896 | 291 | 6,880 | 1,719 | 913 | 15,954 |
| 1981-85..... | 711 | 877 | 3,319 | 98 | 3,961 | 1,061 | 443 | 10,470 |
| Wheat: | | | | | | | | |
| 1976-80..... | 124 | 519 | 953 | 8 | 2,723 | 687 | 630 | 5,644 |
| 1981-85..... | 165 | 202 | 1,189 | 26 | 2,634 | 395 | 319 | 4,930 |
| Corn: | | | | | | | | |
| 1976-80..... | 367 | 942 | 1,775 | 116 | 1,985 | 590 | 240 | 6,015 |
| 1981-85..... | 379 | 566 | 1,007 | 23 | 800 | 432 | 77 | 3,284 |
| Oilseeds: | | | | | | | | |
| 1976-80..... | 9 | 135 | 55 | 8 | 143 | 251 | 163 | 764 |
| 1981-85..... | 20 | 69 | 79 | 4 | 95 | 254 | 295 | 816 |
| Oilseed meals: | | | | | | | | |
| 1976-80..... | 194 | 643 | 949 | 614 | 1,160 | 297 | 172 | 4,029 |
| 1981-85..... | 313 | 755 | 12,082 | 679 | 912 | 212 | 171 | 4,124 |
| Cotton: | | | | | | | | |
| 1976-80..... | 57 | 109 | 90 | 93 | 163 | 111 | 108 | 731 |
| 1981-85..... | 72 | 121 | 112 | 85 | 153 | 101 | 117 | 761 |

¹ Data not available, or amount under 1,000 tons.

² Does not include preserved vegetables.

Sources: Statistical yearbooks of the respective countries; Council for Mutual Economic Assistance, Yearbook; Food and Agricultural Organization of the United Nations, Trade Yearbook.

Nor were the governments able to direct any additional investment to agriculture. It thus became apparent to East European policymakers that further gains in agriculture can be achieved only through increased efficiency and success in controlling costs. Increasingly, they see a drastic restructuring of the sector, based on market-oriented farm management, as the most effective means toward that end. Reform of agriculture offers the prospect of increased food self-sufficiency at a higher level of consumption and lower cost to the state budgets. Achievement of these goals will mean more material incentives for industrial workers, more favor-

able trade balances, and greater availability of funds, including hard currency, for retooling the industrial sectors.

Two distinct approaches have been taken to agricultural reform in Eastern Europe. The more conservative, referred to here as the Bulgarian model, sought to decentralize decisionmaking and raise worker incentives, but did not abandon the basic socialist ideals of central planning and socialized ownership. The Hungarian model, on the other hand, involved significant departures from traditional central planning and sought to allow more of a role for market forces.

Results of reform have been mixed. Hungary has been the most successful, realizing significant increases in its agricultural production and exports as a result of measures increasing farm autonomy and reducing state control.

Attempts to implement similar reforms in Bulgaria, however, have resulted in a state of total confusion, and Romania and the GDR refuse to have anything to do with reform. The most serious problems have been encountered in attempts to rationalize prices and reduce subsidies. Such moves entail a serious drop in the population's living standards, and popular resistance has been formidable, especially in Poland, but elsewhere as well.

POTENTIAL AND REALITY

Eastern Europe has considerable agricultural potential. Extending from the Baltic Sea in the north to the Adriatic Sea and Black Sea in the south, the region affords virtually a crosscut of temperate zone farming. The northern portion of the area, comprising Poland, the GDR, and Czechoslovakia, is characterized by abundant pasture and meadow land which favors animal husbandry, especially dairying. The southern part, including Hungary, Romania, Yugoslavia, and Bulgaria, is characterized by broad, fertile river plains or valleys conducive to the large-scale cultivation of grain and oil-seed crops, which can support intensive hog and poultry feeding complexes. Additionally, the north is well suited to orchard production, while the south can grow a wide variety of specialty horticultural crops.

Eastern Europe has the capability to supply its own needs in most foods, at higher levels than at present, and to become a substantial overall net exporter of agricultural products. This potential can be seen in improved grain yields and higher overall meat production that have been achieved in the 1980's.² (See table 2.) Imports could be confined to high-protein feed components, some semi-processed commodities (such as certain types of tobacco and cotton), tropical products, and a few processed specialty foods. Their value could be more than offset by exports of high-unit-value foods, such as meat and meat products, dairy products, and fresh and preserved fruits and vegetables.

² For further detail on East European agricultural production and trade, the reader is referred to Nancy J. Cochrane and Miles J. Lambert *Agricultural Performance in Eastern Europe in 1987*, Staff Report, U.S. Department of Agriculture, Economic Research Service, forthcoming; U.S. Department of Agriculture, Economic Research Service, *Eastern Europe: Situation and Outlook Report*, RS-87-5, June 1987; and previous annual editions.

TABLE 2.—GRAIN AND LIVESTOCK PRODUCTION

| | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia | Total |
|---|----------|----------------|----------------------------|---------|--------|---------|------------|---------|
| IN 1,000 TONS | | | | | | | | |
| Total grain: | | | | | | | | |
| 1976-80..... | 7,849 | 10,059 | 9,038 | 12,577 | 19,495 | 19,383 | 15,588 | 93,989 |
| 1981-85..... | 8,169 | 10,893 | 10,388 | 14,399 | 22,224 | 21,700 | 16,749 | 104,522 |
| Wheat: | | | | | | | | |
| 1976-80..... | 3,513 | 4,949 | 2,998 | 5,181 | 5,089 | 6,104 | 5,306 | 33,140 |
| 1981-85..... | 4,173 | 5,389 | 3,414 | 6,066 | 5,263 | 6,038 | 5,089 | 35,432 |
| Corn: | | | | | | | | |
| 1976-80..... | 2,652 | 724 | 3 | 6,374 | 165 | 11,097 | 9,192 | 30,207 |
| 1981-85..... | 2,656 | 885 | 1 | 6,977 | 65 | 13,001 | 10,568 | 34,153 |
| Barley: | | | | | | | | |
| 1976-80..... | 1,532 | 3,386 | 3,715 | 769 | 3,560 | 1,981 | 664 | 15,607 |
| 1981-85..... | 1,194 | 3,507 | 3,983 | 1,004 | 3,618 | 2,423 | 700 | 16,429 |
| TONS PER HECTARE | | | | | | | | |
| Total grain: | | | | | | | | |
| 1976-80..... | 3.63 | 3.73 | 3.58 | 4.24 | 2.48 | 3.05 | 3.49 | 3.24 |
| 1981-85..... | 4.01 | 4.23 | 4.13 | 5.02 | 2.75 | 3.49 | 3.90 | 3.65 |
| Wheat: | | | | | | | | |
| 1976-80..... | 3.75 | 4.03 | 4.17 | 4.07 | 2.93 | 2.71 | 3.28 | 3.39 |
| 1981-85..... | 3.85 | 4.66 | 4.86 | 4.64 | 3.29 | 2.70 | 3.46 | 3.71 |
| Corn: | | | | | | | | |
| 1976-80..... | 4.04 | 3.59 | 4.67 | 4.86 | 4.03 | 3.37 | 4.08 | 3.89 |
| 1981-85..... | 4.82 | 4.32 | 5.20 | 6.16 | 4.14 | 4.27 | 4.58 | 4.71 |
| Barley: | | | | | | | | |
| 1976-80..... | 3.16 | 3.68 | 3.79 | 3.24 | 2.76 | 2.99 | 2.23 | 3.21 |
| 1981-85..... | 3.66 | 4.01 | 4.34 | 3.66 | 3.05 | 3.06 | 2.49 | 3.53 |
| IN 1,000 TONS | | | | | | | | |
| Total meat ¹ (carcass weight): | | | | | | | | |
| 1976-80..... | 745 | 1,423 | 1,821 | 1,472 | 3,064 | 1,623 | 1,476 | 11,624 |
| 1981-85..... | 826 | 1,501 | 1,954 | 1,726 | 2,587 | ≈ 1,741 | 1,594 | 11,929 |
| Beef: ¹ | | | | | | | | |
| 1976-80..... | 143 | 424 | 447 | 203 | 869 | 306 | 362 | 2,753 |
| 1981-85..... | 162 | 442 | 442 | 204 | 757 | ≈ 242 | 372 | 2,621 |
| Pork: ¹ | | | | | | | | |
| 1976-80..... | 349 | 803 | 1,198 | 922 | 1,728 | 876 | 798 | 6,674 |
| 1981-85..... | 387 | 837 | 1,317 | 1,100 | 1,419 | ≈ 959 | 798 | 6,817 |
| Poultry: ¹ | | | | | | | | |
| 1976-80..... | 149 | 159 | 137 | 328 | 374 | 363 | 246 | 1,756 |
| 1981-85..... | 157 | 170 | 154 | 400 | 279 | ≈ 462 | 293 | 1,915 |
| Lamb: ¹ | | | | | | | | |
| 1976-80..... | 99 | 6 | 20 | 15 | 29 | 76 | 60 | 305 |
| 1981-85..... | 118 | 10 | 19 | 21 | 30 | ≈ 74 | 60 | 331 |
| Milk: | | | | | | | | |
| 1976-80..... | 1,653 | 5,629 | 8,155 | 2,283 | 16,805 | 4,184 | 4,135 | 42,844 |
| 1981-85..... | 2,076 | 6,398 | 8,371 | 2,749 | 16,006 | 3,841 | 4,591 | 44,032 |
| Eggs (million pieces): | | | | | | | | |
| 1976-80..... | 122 | 258 | 291 | 246 | 480 | 362 | 226 | 1,985 |
| 1981-85..... | 148 | 288 | 314 | 239 | 461 | 417 | 252 | 2,119 |

¹ In order to insure consistency, these numbers were taken from the CMEA Yearbook. The Yugoslav numbers were to conform to the definitions used by CMEA.

² USDA estimate.

Sources: Statistical yearbooks of the respective countries; Council for Mutual Economic Assistance, Yearbook.

However, agriculture has been treated as the stepchild of the economy in Eastern Europe. The sector has suffered from decades of neglect because of official policies favoring rapid industrial development. Investment in agriculture, even as late as 1985, ranged

from a mere 6 percent of total investment in Yugoslavia to 13 or 14 percent in other countries. Such skewed investment has resulted in a poor infrastructure, inadequate storage, large amounts of aging machinery with zero book value, and crumbling irrigation systems. Also, major and extensive deficiencies in the quality of arable land, such as overly saline soils in Romania and severe erosion in hilly parts of Hungary, have not been adequately corrected and preclude optimal productivity.

In addition, policies have deliberately held down agricultural prices, in order to improve the standard of living of the urban, industrial population, while at the same time prices of industrial inputs have escalated. The result has been the failure of many socialized farms to realize a profit, necessitating large government subsidies, which have constituted a huge drain on country budgets. Future prospects have also been damaged because lagging rural incomes have spurred the continuing migration by agricultural workers to urban areas. While agriculture's share in the total labor force is still large relative to more developed countries, this migration causes a serious problem in that it is the younger, more highly trained worked who are quitting the farms, leaving the older, less productive workers behind.

Moreover, CMEA's lack of conformity to world prices, the resulting incompatibility in pricing among the member countries, and the lack of currency convertibility, have hindered the free mutual exchange of farm goods that would improve cross-country specialization and use of agricultural resources.³ The region's agricultural goals continue to be shaped by a desire for some form of national autarky in food, usually meaning balanced farm trade. Such policies have given rise to agricultural trade policies which contribute to production distortions and trade anomalies in the region. On the one hand, the region's net agricultural exporters (Hungary, Romania, and Bulgaria) seek to maximize hard currency earnings by selling outside the region, whether or not they are actually competitive producers of the exported commodities, and in spite of hard currency outlays that might have to be made to produce salable quality. On the other hand, the net importers (the GDR, Czechoslovakia, Yugoslavia, and usually Poland), although anxious to minimize hard currency outlays, must look largely to suppliers outside the region to sustain present levels of consumption.

APPROACHES TO AGRICULTURAL REFORM

Reform of the agricultural sector in Eastern Europe has to address issues such as rising costs, high levels of subsidies, underdeveloped infrastructure, outmigration of labor, and low-labor productivity. The task is hindered by agriculture's continuing subordinate role to industry, and by the status of most farm commodities as "basic," or "strategic." Because of those factors, prices for agricultural commodities will most likely continue to be regulated, and foreign trade more tightly controlled than in the case of industry.

³ The Hungarian economists E. Borszeki, S. Meszaros, and Gy. Varga state that, many "breaches" in CMEA cooperation as concerns agricultural specialization have occurred, and that "autarky increasingly is replacing the exchange of goods" as the guiding aim of Hungary's partners. *Elelmiszer-gazdasagunk versenyképessége*, Budapest, 1986, p. 13.

Whereas, in some countries, many industrial enterprises are now directly engaging in foreign trade, very few agricultural enterprises are doing so.

However, agriculture also has advantages with respect to reform prospects. For one thing, agricultural enterprises generally require less time and investment to alter the structure of their production than do industrial firms. It is much easier for a farm to shift resources from one line of production to another than for a factory. For this reason, a shift in policy which allows managers to make more of their own decisions can produce more rapid gains from specialization in agriculture than in industry.

The presence of a much more significant private sector than in the case of industry also can speed reform in agriculture. The private sector contribution to agriculture is significant even in the most rigidly centralized countries, such as Romania and the GDR. In 1985, the share of the private sector in gross agricultural production ranged from 10 percent in Czechoslovakia, 34 percent in Hungary, to 69 and 78 percent, respectively, in Yugoslavia and Poland. Private farmers throughout Eastern Europe tend to specialize in the more labor-intensive lines of production, such as fruit, vegetable, and livestock raising. For this reason, agricultural policies encouraging greater labor productivity can have a rapid and profound effect on agricultural production.

Two distinct approaches to reform in East European agriculture can be identified. The first does not involve any departure from the fundamental premises of central planning, and is typified by Bulgaria's New Economic Mechanism. This is the model that Bornstein labels *administrative decentralization*.⁴ Its central feature is an increase in farm autonomy through a reduction in the number of plan indicators assigned from above. In many cases, a reorganization of farm structure, some devolution of decisionmaking from federal organs to district association, and a variety of incentives to raise productivity and reduce losses are also involved. The second model, which Bornstein refers to as *economic decentralization*, entails a radical departure from traditional central planning, and is typified by Hungary. Key features are the replacement of indicative planning with financial instruments and at least a partial liberalization of prices. Further discussion of the two models follows.

THE BULGARIAN MODEL

Although many of its elements are reminiscent of the 1982 Soviet Food Program, the Bulgarian NEM of 1979 is the most comprehensive reform program of this type that has been introduced in Eastern Europe.⁵ It grew out of a recognition that agricultural efficiency was greatly hampered by overcentralization and a need to boost productivity without any increases in resources going to the sector. This program was not intended to weaken central planning or to allow market forces much of a role in setting prices. Rather,

⁴ Morris Bornstein, "Economic Reform in Eastern Europe," *East European Economies Post-Helsinki*, a Compendium of Papers Submitted to the Joint Economic Committee of the Congress of the United States, 1977, pp. 102-134.

⁵ A detailed discussions of the Bulgarian NEM can be found in Nancy J. Cochrane, *The New Economic Mechanism in Bulgaria*, Staff Report AGES851121, U.S. Department of Agriculture, Economic Research Service, 1986.

the aim of the NEM was to streamline decisionmaking and give farm managers and workers material incentives to improve performance. The main elements of the Bulgarian model are detailed below.

Reorganization.—Bulgaria abolished its Ministry of Agriculture and the Food Industry, replacing it with a supposedly more streamlined National Agro-Industrial Union (NAIU). There were also moves to create horizontal associations of farms, usually on a territorial basis, as exemplified by Bulgaria's District Agro-Industrial Unions. In a similar vein, Hungary separated its Ministry of Agriculture and Food Industry into two ministries, while Hungarian agro-industrial unions and Romanian territorial cooperative councils represent efforts at horizontal association.

Changes were made in farm structure as well. In 1970, the Bulgarian Government began the amalgamation of its state and collective farms into horizontally integrated Agro-Industrial Complexes (AIC's). The brigade became the basic unit of production under the AIC: there are no intervening layers of organization. By the end of the 1970's, the Bulgarian Government decided that the AIC's were quite unwieldy because of their large size, and between 1977 and 1979 their number increased from 143 to 268, while the average amount of arable land belonging to them fell from 24,494 to 13,568 hectares. During the same period, the GDR agricultural sector also underwent a reorganization in which livestock and crop production were separated from one another; presently, almost all the State and collective farms specialize in either crops or livestock. Hungary, meanwhile, has gradually merged smaller socialized farms into larger ones.

Planning.—Fundamental to the Bulgarian model are a reduction in the number of planning indicators and an increase in the autonomy of production enterprises. Planning indicators in Bulgaria now only cover compulsory sales of commodities to the State, which deliveries are to cover no more than eight commodities; export earnings by the AIC and limits on imports by it; contributions to the State budget; and limits on the use of certain inputs.

Bulgarian farms are now free to make their own decisions regarding everything not specified in the plan, including acreage, livestock inventories, employment, and to a limited extent, investment. They are expected to contract on their own with purchasing organizations for the sale of above plan production (with prices still set by the State, however); they also contract with machinery stations, veterinary and other service organizations.

Self-financing.—The principle of self-financing has been introduced throughout Eastern Europe. Each production unit, down to the brigade, is expected to cover its costs and make a profit without help from the State. In addition, wages are linked to performance. The enterprise and brigade wage funds are now the residual after all other financial obligations have been met. Bonuses are awarded for above plan performance. At the same time, workers receive only part of their wages (90 percent in Bulgaria) before the end of the year; the balance paid at year end depends on results achieved by the brigade.

Changes in foreign trade organization.—The Bulgarian model retains the system of monopoly foreign trade organizations (FTO's),

but attempts are made to give enterprises incentives to produce for export. Enterprises are given targets for foreign exchange earnings, and are often allowed to retain a percentage of above-plan foreign exchange earnings. The FTO's have also been placed on a self-financing basis and are liable for any losses they incur. In some countries the FTO's have been detached from the Ministry of Foreign Trade and placed under the appropriate industrial ministry. In Bulgaria, however, FTO's are still subordinated to the Ministry of Foreign Trade, although they are required to contract with production enterprises, and links between FTO's and producers are said to be very close.

THE HUNGARIAN MODEL

Hungary's experience with economic reform dates to 1968, when its leaders reacted to slowing economic growth with experimental solutions involving market-oriented principles. Government control and centralization were reimposed during the 1973-78 period, at the Soviet Union's insistence, but by 1980, the Hungarians had returned to the principles of the 1968 NEM. Although the Hungarian model incorporates many of the elements of the Bulgarian one, it has gone much further toward reducing the role of central planners and allowing market forces to influence production decisions.⁶

Planning.—While Bulgaria reduced the number of plan indicators, as late as 1985 as much as 80 percent of agricultural production was reported to be mandated by State plans. In the Hungarian model, on the other hand, no plan indicators are assigned to enterprises. Although plans are still formulated at the national level, with physical output targets for major commodities such as grains, those do not translate into compulsory targets for individual farms. Instead, financial instruments are used to induce enterprises to conform to national goals. These include prices, taxes, credits, and subsidies, which are used to encourage certain lines of production, regulate incomes, and promote investment in line with national priorities.

Greater enterprise autonomy.—Hungarian enterprises have much more latitude in planning their activities than do Bulgarian enterprises. They make their own production decisions, including those concerning the purchase and sourcing of inputs. Suppliers of inputs are thus in theory forced to compete with one another. Enterprises can also decide where they will sell their output. Hungarian enterprises also have more control over their investments than Bulgarian farms; the latter until recently have been allowed to initiate only very small investment projects. Of particular interest, Hungary has encouraged the development of *technically oriented production system* (TOPS), which are integrated packages of inputs and technologies that are developed by individual farms. These systems are then marketed to other farms and continue to be managed by the supplier farms. The various TOPS must compete with one another, since a farm can choose which system to subscribe to and may join more than one. Additionally, agricultural enterprises in

⁶ For further discussion, see Csaba Csaki, "Economic Management and Organization of Hungarian Agriculture" and Michael Marrese, "Agricultural Policy and Performance in Hungary," both in *Journal of Comparative Economics*, Vol. 7, No. 3, September 1983.

Hungary are allowed to form new sections to engage in nonagricultural lines of production.

Prices.—Bulgaria and other countries following the more conservative reform model implemented significant rises in agricultural procurement prices in order to raise rural incomes. However, authorities continued to hold down retail prices, so that large subsidies were necessary. An important objective of the Hungarian model is to align domestic producer prices (which tend to be higher than world levels) with world market prices and allow retail prices to rise so as to allow the elimination of subsidies. Prices of goods which are traded for hard currency are supposed to be set on the basis of their world market price, converted to the local currency. Prices of import substitutes are set according to the world prices of similar goods. Prices of goods purely for domestic consumption are set to cover average production costs. Prices of agricultural commodities, however, continue for the most part to be set by the authorities, and do not always conform to these principles.

Foreign trade decisionmaking.—Under the Hungarian model, the monopoly status of the FTO's is in principle abolished. Production enterprises are allowed to choose among the existing FTO's and may deal with more than one. Alternatively, an enterprise may apply for its own foreign trade rights, either on a permanent or an ad hoc basis. In Hungary, over 250 enterprises in all sectors of the economy now have such rights (in Poland, the number is over 800). Export profitability has been introduced as a plan indicator. Efforts are also underway to provide uniform exchange rates, with the ultimate goal being full convertibility of the currency.

A common feature of the Bulgarian and Hungarian models for agricultural reform is stimulation of the private sector, a goal largely shared by the other countries. As the East European countries became less able to add resources to the agricultural sector, their governments came to recognize the potential of the labor-intensive private sector to realize quick gains, given the proper incentives. For that reason, most of the East European countries introduced measures toward that end during the early 1980's. Typical measures required socialized farms to sign contracts with their plottolders, whereby the farm would provide seeds, fertilizers, young animals, feed, and other inputs, while the plottolder sold the finished production to the farm at a preestablished price. In some cases, notably Bulgaria, the farm is then allowed to count this production toward its own plan fulfillment. In other countries, plottolders who sell to State organizations are given a variety of tax breaks. Hungary has gone the furthest in encouraging the private sector and has made efforts to produce small tractors and provide fertilizer and other materials in quantities suitable for private producers. Hungary has also targeted credit and input subsidies specifically to private farmers.

PROGRESS TOWARD AGRICULTURAL REFORM

The East European response to the pressures for reform runs the gamut from virtually no response at all to attempts to introduce radical changes. Recently, Bulgaria and Poland, as well as the U.S.S.R. have announced intentions to adopt the Hungarian model

of reform. Some of the proposed changes challenge the basic premises of the centrally planned system, and some serious contradictions have arisen as the East European governments try to reconcile the principles of Hungarian-type reform with the continuation of central planning and socialized ownership.

Agricultural performance during the 1980's was mixed. Overall, there was an 11-percent rise in average grain production during 1981-85 over the 1976-80 average, with a 13-percent rise in yields. Every year since 1982, regional grain production exceeded 100 million tons, reaching a record of nearly 119 million tons in 1986. There have also been significant rises in oilseed production. Despite the contraction of the early 1980's livestock production on the whole has increased, thanks to increasing domestic grain output and continued high imports of protein meals. With that has come a rise in per capita meat and dairy product consumption everywhere except Poland. (See table 3.)

TABLE 3.—PER CAPITA CONSUMPTION OF SELECTED PRODUCTS, 1975 AND 1985

(In kilograms)

| | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania ¹ | Yugoslavia |
|---------------------------|----------|----------------|----------------------------|---------|--------|----------------------|------------------|
| Meat: ¹ | | | | | | | |
| 1975..... | 58 | 81 | 78 | 69 | 70 | 46 | 48 |
| 1985..... | 73 | 86 | 96 | 77 | 60 | 56 | 55 |
| Grain: | | | | | | | |
| 1975..... | 162 | 108 | 95 | 118 | 120 | 189 | 183 |
| 1985..... | 146 | 109 | 99 | 106 | 116 | 174 | 175 |
| Vegetables: | | | | | | | |
| 1975..... | 127 | 74 | 90 | 85 | 109 | 113 | 87 |
| 1985..... | 130 | 75 | 104 | 76 | 105 | 170 | 81 |
| Dairy products: | | | | | | | |
| 1975..... | 198 | 210 | 111 | 127 | 432 | (²) | 93 |
| 1985..... | 268 | 248 | (²) | 182 | 426 | (²) | (²) |

¹ Unofficial estimates of the Economic Research Service, USDA.

² Meat consumption is reported without fat for Czechoslovakia, the GDR, and Hungary. For the remaining countries, these numbers include fat.

³ Not available.

Sources: Statistical Yearbooks of the respective countries; Council for Mutual Economic Assistance, Yearbook.

However, not all has been so rosy. Polish meat output and consumption is still below the 1976-80 average. The three Balkan countries—Romania, Bulgaria, and Yugoslavia—have also had difficulties, suffering large, weather-induced oscillations in production. Irrigation in all three countries remains woefully inadequate, and droughts of 1983, 1985, and 1987 had a devastating impact on yields. Average crop output in Bulgaria, for example, rose just 1 percent during 1981-85. Yugoslavia achieved record corn crops in 1984 and 1986, allowing over 1 one million tons of corn exports in 1987. However, its 1987 crop was down by a third, requiring substantial corn imports in 1988.

THE ACTIVE REFORMERS

Hungary.—Reform has gone further in Hungarian agriculture than in industry. Progress was not impeded during the 1970's, as happened with industry, and domestic output, as well as the

volume of exports have increased despite a reduction in agriculture's share in investment. However, production costs have remained high, and farm export earnings leveled off during the 1980's due to low-world prices for livestock products. Consequently, high subsidies have continued, especially for livestock producers.

Despite the economic doldrums of the 1980's, Hungary is likely to remain at the forefront of CMEA reform, especially following the installation of a new, economically bolder, leadership in May 1988. With the highest per capita foreign debt in Eastern Europe, Hungary is dependent on continued support from Western lenders. Such support is contingent on Hungary's further integration with the world economy, which requires phasing out subsidies, allowing consumer prices to rise, and aligning producer prices with world levels. These moves are also essential in order to increase exports to the West, which Hungary sees as the long-term solution to its debt problem. To this end, Hungary has been an active participant in the preparations for multilateral trade negotiations as a member of the Cairns Group. Hungary is the only nonmarket economy in this group, and the goal of its members is liberalized trade. In its drive toward more cost-effective production, the Hungarian Government passed a law in 1987 which permits the bankruptcy of State enterprises, and in 1988 introduced a value-added tax as a means for offsetting the use of state subsidies to sustain inefficient firms. The intent of these measures is to force firms to adopt realistic accounting and pricing throughout their operations in order to assure sound management.

Further gains in exports are deemed crucial for the long-term health of the agricultural sector. Hungarian agricultural economists consider that in spite of the sector's relatively high use of costly inputs, Hungarian agriculture could prove to have a comparative advantage in some commodities if world trade in them were liberalized.⁷ Furthermore, in the case of high-value processed goods in particular, these economists seem to believe that Hungary has the potential to meet the exacting qualitative demands of Western consumers at competitive prices.⁸ It is expected that further implementation of reforms, especially accommodation to world prices, will identify the farm sectors (commodities) in which Hungary has an advantage.

Prospects for reform are reinforced by the 10-year trade and co-operation accord Hungary concluded with the European Community (EC) in 1988, which provides for a three-stage lifting of all current quotas on Hungarian exports. Hungarian high-value processed goods for the most part have the best chance of being sold on EC markets. The Hungary-EC accord calls for greater EC access to the Hungarian market, thereby providing competition for domestic producers. The opening up of Hungary's market should also mean more direct participation by farms and food enterprises in foreign trade than is now the case, as well as partnerships with Western processing firms able to offer improved technologies.

However, the drive to increase agricultural exports is balanced by attention to the domestic market, since the availability of better

⁷ Borszeki *et al.*, *op. cit.*, p. 21.

⁸ For example, see *ibid.*, pp. 266, 276-277, 278, concerning meat products.

quality food is considered as one incentive for industrial workers to support Hungary's reform efforts. The country's private sector, which already receives the most favorable treatment among the CMEA countries, is likely to be encouraged further on that account. Increased output by private producers will be essential in order to alleviate rising food prices and stagnant per capita consumption which likely will characterize Hungary in the short term as reform moves forward. The private sector is likely to gain greater freedom in marketing its output, although in some cases it might require the joining of several producers in some form of association.

Bulgaria.—The NEM Bulgaria introduced in 1979 did little to halt the negative trends of the 1970's, mainly because its measures were never fully implemented. Output stagnated, and the agricultural trade balance worsened. The Bulgarian response to its worsening economic performance has been two-pronged: the introduction of a new NEM embodying many of the features of the Hungarian model and repeated reorganizations of the governing bodies.

In December 1986, Bulgaria issued a new set of reforms, which includes several radical proposals similar to Gorbachev's and reminiscent of the Hungarian NEM. The cornerstone is the concept of self-management: the enterprise is now responsible for "resolving all questions pertaining to the management of social property granted to it".⁹ The NEM also calls for the replacement of indicative planning with economic regulators and State orders, the decentralization of input supply (with enterprises able to choose among suppliers), and the linking of wholesale prices with international prices. For agricultural commodities, the Government will set only the prices of the basic products which it will buy through State orders. Other prices are to be set through contracts. Enterprises are also to compete with one another for State orders, and finance investment out of their own funds. Unprofitable enterprises may be allowed to go bankrupt.

Major organizational changes have also occurred. In March 1986, NAIU lost its ministerial status, and was replaced by a new Ministry of Agriculture and Forestry. A year later, the new Ministry was disbanded and replaced by a Council of Agriculture and Forestry. This Council was abolished after less than a year, at which time the Ministry of Agriculture and Forestry was resurrected. NAIU now has the status of an "association of self-governing economic organizations in agriculture, the food industry, and other interested units".¹⁰ Finally, in the summer of 1987, the Government abolished the *okrugs* (or districts) and replaced them with larger and fewer *oblasts*.

All reports coming from Bulgaria suggest that the constant reorganizations coupled with the rapid introduction of radical changes in economic management have resulted in a state of total confusion.¹¹ Furthermore, since 1986, periodic shortages have arisen, principally of meat, fresh fruits and vegetables. Low-procurement prices, which fail to keep up with escalating costs for fuel and ma-

⁹ *Novo Vreme*, No. 3, Sofia, 1987, pp. 44-61.

¹⁰ *Rabotnichesko Delo*, Sofia, Apr. 24, 1987.

¹¹ *Financial Times*, London, Sept. 9, 1987.

chinery, combined with loosening State control over production decisions, have given rise to serious problems with the procurement of basic commodities.¹² Even with substantially improved yields, producers cannot make a profit. The brigades, which are now apparently making more of their own decisions, are deciding not to plant unprofitable crops. Private farmers, meanwhile, are refusing to sell to State organizations.

Poland.—Attempts at reform began in Poland in 1981, with measures along the lines of those in Bulgaria, especially those regarding decentralization of decisionmaking, but also with some of the price liberalization typical of Hungary. However, the measures were vague, and the early 1980's were not propitious for implementing them. With the imposition of martial law, all credit from the West was cut off, and the Polish economy was forced to undergo a severe contraction. Only in 1986 did the Polish Government introduce its "second stage" reforms, an ambitious program which incorporates many of the elements of the Hungarian model.

The goal of reform in agriculture, as in the rest of the economy, is to eliminate monopolies that dominate the food sector, to abolish central control over the marketing of food and farm products, as well as the sale of tractors and other inputs, and to cut subsidies and allow prices to balance supply and demand. Farms that are able will be allowed to engage directly in food trade, and small-scale processing, servicing and storage facilities will be encouraged.

The most difficult goal to accomplish will be a reduction of subsidies and a liberalization of most prices. Subsidies are to be either eliminated or "transformed into an instrument of control over demand and the stimulation of the development of food production," with remaining subsidy rates to be uniform among all producers, thereby eliminating inefficient producers. The Government had hoped to raise retail food prices by an average of 110 percent in 1988, which would have allowed the total elimination of meat rationing. However, failure to win popular support for its reform program in the November 1987 referendum caused the Government to scale back its planned price increases to 40 percent. Yet, even those more modest increases have given rise to popular resistance.

Because of the large role of private farmers in Polish agriculture, improvement of conditions for the private sector is crucial to agricultural reform. Shortly after Poland embarked on its initial reform program, the private sector was declared equal to the socialized sector, with respect to access to markets and inputs; the equality of the private sector was further guaranteed in a constitutional amendment of 1983. Private farmers were promised the right to own and inherit land and equal access to credit. Increased supplies of fertilizer, machinery and spare parts were made available, and the private sector's share in investment rose from 34 percent in 1980 to 56 percent in 1982. In part as a result of those increases, grain yields have improved in recent years.

Nevertheless, after initial improvement, profitability has once again become a problem in the private sector. Procurement prices

¹² Rada Nikolaev, "Agricultural Procurement Prices, A Crucial Issue for the Economy," RFE SR/11, Nov. 20, 1987; *Kooperativno Selo*, Sofia, Dec. 3, 1987.

were raised in 1981 with the intention of putting rural incomes on a par with urban ones, and they in fact reached 110 percent of the national average in 1982. Since 1953, however, income gains have been wiped out by huge increases in the prices of industrial inputs, and the ratio between farm income and the national average fell to 85 percent by 1987. At the same time, the private sector's share in agricultural investment dropped back to 51 percent by 1986. The situation adversely affected State procurements—notably livestock procurements. With its 1988 price hikes, the Polish Government is attempting to raise farm income parity again. Thus, whereas food prices rose an average of 40 percent at the beginning of 1988, procurement prices rose 48.4 percent, with meat and milk prices rising by over 50 percent. However, at the same time, average input prices went up by 90 percent.¹³

Yugoslavia.—Yugoslavia has only observer status in CMEA, and since Tito's break with Stalin in 1948, the country has pursued a unique form of market-oriented socialism, so that its experience has been somewhat different from that of the rest of Eastern Europe. Nevertheless, Yugoslavia has much in common with the other East European countries, and its experience can be viewed as a warning of the pitfalls of attempting to reconcile market forces with the preservation of socialist ideology. Yugoslavia is struggling with triple-digit inflation, and decisionmaking has become so decentralized that the federal government has been unable to implement the measures needed to impose discipline on the market. In May 1988, the Government introduced a set of radical reforms intended to address many of the imbalances in the economy. In many ways the measures resemble the reforms in Hungary and Poland. The goal is to free most domestic prices from State control—by July 1988, some 70 percent were being set freely—and eliminate most barriers to imports.¹⁴

Yugoslav agriculture is plagued by rising costs. While the Government attempts to control prices of basic farm commodities and some processed goods, such as meat, bread and vegetable oil, it allows prices of other goods, including farm inputs, to be set through self-management agreements among firms in the "reproduction chain." Since this system of agreements virtually eliminates competition among suppliers, price increases are practically unrestrained. Some major difficulties have arisen in consequence, especially in the livestock sector, where producers have been caught between high-feed costs (occasioned by free market corn prices) and controlled domestic meat prices, as well as slack export demand. Meat production has stagnated, and milk, whose price is also controlled, has been in short supply, since producers prefer to sell dairy products whose prices are not controlled. Yugoslavia's milling industry has been caught in a similar squeeze.

The Yugoslav Government remains ambivalent toward the dominant private sector. Peasants are encouraged to contract with socialized farms and to join cooperatives (roughly equivalent to marketing cooperatives in the United States), but farmers are suspi-

¹³ *Rzeczpospolita*, Warsaw, Feb. 1, 1988.

¹⁴ *Financial Times*, London, Aug. 12, 1988.

cious of such organizations, complaining of practices, which result in unfavorable prices.¹⁵ Consequently, policies stressing better integration with the socialized sector continue to have limited success. On the other hand, discussion of raising the maximum private landholdings—normally 10 hectares, but sometimes more in mountainous regions—is intensifying. Yugoslav economists have long argued that the private farms are more efficient even than the socialized farms, and a Yugoslav amendment introduced in 1986 and passed November 1986 prohibits the republics from setting a land maximum under constitutional tares. The amendment had to be approved by all the republic assemblies, and resistance has been formidable, especially in Vojvodina, where the socialized sector is particularly strong.¹⁶

CZECHOSLOVAKIA: THE HESITANT REFORMER

The resignation of Gustav Husak in December 1987 was immediately followed by a resolution of the Central Committee of the Communist Party calling for economic restructuring and setting out a timetable for implementation. However, Czechoslovakia's approach to reform continues to be cautious, a result of the continuing legacy of the 1968 Soviet intervention.

Restructuring is to be introduced into the agricultural sector in 1989. In preparation for that an agricultural bill was approved in June 1988, which gives cooperatives substantially more autonomy and will allow them to branch out into processing and even non-agricultural activities. At the same time amendments were added to the 1980 Law on External Economic Relations, which allows enterprises to engage directly in foreign trade and initiate cooperation agreements. New, and more highly differentiated wholesale prices will be introduced in 1989. Finally, an amendment to the 1975 law on land use was passed in June 1988, which provides for the "reprivatization" of land deemed unsuitable for large-scale, cooperative production.

THE NONREFORMERS

The GDR.—In line with its opposition to reform generally, the GDR maintains that the difficulties facing its farm economy can be resolved within its present, highly socialized framework (about 96 percent of agricultural land is in the socialized sector). Shortcomings mostly concern the application of inputs for farming and the quality of food produced, problems which can be solved through better management techniques. Therefore, the Government has given priority to strengthening vertical integration between cooperatives and State farms, as well as between agriculture and the food industry. That spells tighter central control over decisions taken by producers. However, the Government has also offered greater incentives for farm managers to aim at profitability by increasing premiums for quality products in 1988.

Romania.—In 1979, Romania too adopted an economic "restructuring" program. However, its purpose was to strengthen central

¹⁵ *Ekonomška Politika*, Belgrade, Apr. 20, 1987, pp. 21-23.

¹⁶ *Nedelne Informacione Novine*, Belgrade, Jan. 17, 1988.

control and was motivated largely by the desire to maximize the agricultural sector's export earnings at virtually any cost. To that end, a self-supply program was initiated, whereby the counties must deliver their entire output to State purchasing organizations, which in turn deliver a given quantity of food back to the county retail networks. This quantity is determined according to government-established consumption norms, which appear to be manipulated so as to assure export supplies. State and cooperative farms have been grouped into territorial agro-industrial councils whose purpose is to implement the quantitative plans drawn up by central authorities.

At the same time, the private sector, which supplies a substantial share of certain foods, including meat, is under attack, seemingly with the goal of its elimination. A 1984 decree assigns private farmers "crop plans" and requires delivery of specified portions of output to the State.¹⁷ Romania has also begun implementation of the so-called "systematization" plan, which calls for razing about two-thirds of the country's villages and moving the peasants into "agro-industrial centers." A stated goal of this plan is to increase output by bringing 350,000 hectares of new land under cultivation. However, implementation seems certain to bring about a drastic reduction, if not a total elimination of private farming.

CONCLUSIONS: PROSPECTS FOR LASTING REFORM AND IMPLICATIONS FOR AGRICULTURAL TRADE

The results of agricultural reform in Eastern Europe have been mixed. Prices have been held down for so long that drastic price increases are necessary to eliminate subsidies. Yet, because of the strategic status given to agricultural commodities generally, there has been little progress in liberalizing prices and reducing subsidies. Moreover, popular resistance has been on the increase, not only in Poland, but elsewhere. Serious contradictions have arisen as authorities are torn between the population's expectations of a continued rise in living standards and the need to bring supply and demand into better balance.

Measures improving conditions for private producers have had positive results everywhere.¹⁸ There have been significant rises in the private sector shares of meat, fruit and vegetable production throughout the region, and in Bulgaria the private sector contributed the entire increase in meat production in the 1981-85 period. However, governments still adhere to an ideology which requires that the dominance of the socialized sector be maintained, and gains by private producers are hampered by continued suspicion of the "rich kulak." It is quite possible that if economic conditions improve, government enthusiasm for the private sector will wane.

There has been some liberalization in foreign trade for commodities such as fruits, vegetables, and wine. However, in the case of strategic commodities such as grains and livestock products, the monopoly status of FTO's dealing in agriculture continues for the most part. Because the repeated increases in procurement prices

¹⁷ *Scinteia*, Bucharest, Jan. 19, 1984.

¹⁸ For further discussion of the private sector, see Nancy J. Cochrane, "The Private Sector in East European Agriculture," *Problems of Communism*, March-April 1988, pp. 47-53.

has in many cases led to domestic producer prices which are much higher than world prices, governments find it necessary to maintain tight controls on imports. In the case of agricultural exports—mainly livestock products—the belief is prevalent that because of intense competition in international markets, a strong monopoly position gives an FTO more leverage with foreign buyers.¹⁹ That may be true, but as a result, producers continue to feel isolated from international markets. For them, exports are not profitable, and serious procurement problems can result, especially where small, private producers are the main suppliers.

Even if efforts toward reform are mired in such contradictions, prospects for agricultural trade in the 1990's look brighter. Because of foreign exchange shortages, East European traders have become more westward oriented and more attuned to the international markets (the problem lies in the transmission of these signals to domestic producers). The Eastern European countries have made great strides toward bringing their grain trade into balance. At the same time, there has been a marked increase in exports of livestock products. At present, the most serious external constraint on livestock exports is the import barriers of the EC. However, many of the East European countries are currently engaged in negotiations with the EC, and there is some hope that these barriers will be reduced in the near future. Progress on this front will require opening up markets for imports from the EC and will force domestic producers to be more cost effective. Furthermore, exporters have been concentrating more and more on higher value livestock products, so that the average unit value of their exports has been rising. The rebound in livestock production has fueled rises in imports of oilseeds and products, and these increases can be expected to continue.

With the drastic cutback in the region's imports in the 1980's, U.S. agricultural exports to Eastern Europe plummeted, falling from a peak of \$2.3 billion in 1980 to a low of \$434 million in 1986. (See table 4.) However, U.S. exports were up in 1987 and 1988, primarily a result of the Export Enhancement Program (EEP). This program was introduced in 1986 in an attempt to win back markets lost to lower priced suppliers. Under it a U.S. exporter could negotiate a sale with a foreign buyer at a price competitive with world levels and then apply to the Commodity Credit Corporation (CCC) for a bonus from CCC stocks to make up the difference between the sale and U.S. market price. Because of the EEP, U.S. grain exports to Eastern Europe rose from 998,000 tons in 1985 to 2.5 million in 1987.

¹⁹This is the position of the director of the Polish FTO Animex, as quoted in *Zycie Gospodarcze*, Warsaw, No. 15, Apr. 10, 1988.

TABLE 4.—U.S. AGRICULTURAL TRADE WITH EASTERN EUROPE

| | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia | Total |
|-----------------------------|------------------|------------------|----------------------------|------------------|--------|---------|------------|-------|
| IN MILLIONS OF U.S. DOLLARS | | | | | | | | |
| Agricultural imports: | | | | | | | | |
| 1976-80..... | 51 | 181 | 352 | 37 | 519 | 256 | 171 | 1,567 |
| 1981-85..... | 75 | 50 | 177 | 31 | 254 | 181 | 192 | 959 |
| Agricultural exports: | | | | | | | | |
| 1976-80..... | 19.9 | 6.7 | 2.1 | 28.9 | 148.8 | 26.5 | 85.2 | 318.1 |
| 1981-85..... | 23.5 | 10.2 | 1.8 | 42.4 | 96.9 | 19.0 | 64.6 | 258.5 |
| IN 1,000 METRIC TONS | | | | | | | | |
| Principle exports total | | | | | | | | |
| grain: | | | | | | | | |
| 1976-80..... | 230 | 723 | 2,074 | 44 | 2,769 | 864 | 522 | 7,226 |
| 1981-85..... | 326 | 180 | 1,086 | 5 | 696 | 394 | 218 | 2,906 |
| Wheat: | | | | | | | | |
| 1976-80..... | (¹) | 165 | 294 | (¹) | 617 | 244 | 250 | 1,570 |
| 1981-85..... | (¹) | (¹) | 56 | (¹) | 73 | 13 | 135 | 277 |
| Corn: | | | | | | | | |
| 1976-80..... | 240 | 549 | 1,650 | 21 | 1,840 | 544 | 254 | 5,098 |
| 1981-85..... | 314 | 180 | 947 | (¹) | 617 | 382 | 77 | 2,516 |
| Soybeans: | | | | | | | | |
| 1976-80..... | (¹) | 6 | 5 | (¹) | 134 | 222 | 155 | 522 |
| 1981-85..... | 13 | 5 | 3 | (¹) | 91 | 234 | 238 | 584 |
| Soymeal: | | | | | | | | |
| 1976-80..... | 73 | 281 | 345 | 95 | 356 | 158 | 133 | 1,441 |
| 1981-85..... | 71 | 39 | 101 | 91 | 148 | 91 | 111 | 653 |

¹ Data not available, or amount under 1,000 tons.

Sources: Bureau of the Census, U.S. Department of Commerce.

There is hope that U.S. agricultural exports to the region will continue their rebound in the coming years, although they will probably never reach the level of the late 1970's. The United States continues to be the primary supplier of soybeans to Eastern Europe and will benefit from any rise in regional imports. In other commodities, the United States will continue to encounter stiff competition from other suppliers. Since problems with foreign exchange availability will not disappear in the near future, East European importers will continue to emphasize countertrade arrangements and actively seek out the lowest prices. Much of the U.S. market in soybean meal, for example, has been lost to Latin American suppliers, who offer lower prices and are more willing to engage in countertrade. The success of the EEP is a clear indication of the importance of prices in penetrating East European markets. Willingness to increase imports from Eastern Europe will also help to raise the U.S. market share.

COMPARATIVE AGRICULTURAL PERFORMANCE AND REFORM IN EASTERN EUROPE, 1975 TO 1988 *

By Gregor Lazarcik**

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*Research Project on National Income in East Central Europe and City University of New York, Brooklyn College. I am greatly indebted to Dr. Thad P. Alton for critical reading of the draft and for many useful comments and suggestions. I also wish to thank all my colleagues, particularly Mrs. Elizabeth M. Bass and Krzysztof Badach for their warm cooperation in various aspects of the preparation of this study. A debt of gratitude is owed to Brooklyn College for providing some timely help. Final responsibilities for any remaining shortcomings are, of course, my own.

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SUMMARY

Agricultural performance has been uneven among the East European countries, and within particular countries, over different sub-periods since 1970. In the 1970-75 period, agricultural output grew at a high annual rate of 3.9 percent for the whole region. In 1975-80, there was a substantial slowdown in rate of growth to 1.6 percent, and in 1980-85, the rate was only 1.4 percent annually. In 1986, output rose substantially (by 5.2 percent) due largely to favorable weather. In 1987, preliminary reports indicate a 1.7 percent decrease in output for the region as a whole. In 1988, output rose about 1.2 percent. Expenses, however, have been increasing at higher annual rates than output, except for the last 7 years. Combined factor productivity continued to rise rapidly in Yugoslavia, but at much slower rates in Bulgaria, Hungary, Czechoslovakia, and the GDR, and decreased in Poland, with a slow progress for the region as a whole due to adverse weather and other factors. The terms of trade for agriculture (price parity ratios) increased in Bulgaria, Poland, Yugoslavia, and Romania in the last 16 years, while they decreased somewhat in Czechoslovakia and more substantially (close to 20 percent) in Hungary. In international comparisons in terms of per capita levels of output, East European levels are below the U.S.A., and the ranking in descending order is: Hungary (above the U.S. level), the GDR, Bulgaria, Romania, the U.S.S.R., Poland, Czechoslovakia, and Yugoslavia.

Since the East European countries have been somewhat slow to accept Gorbachev's influence in economic affairs, it is too early to show any significant changes in agricultural performance. However, if the recent incentive policies conducive to increasing agricultural output and productivity continue unabated in the future, Eastern Europe as a whole could become self-sufficient in agricultural production in the 1990's.

I. INTRODUCTION

Gorbachev's announced policy reforms in the Soviet Union are slowly and unevenly penetrating to some East European countries. The importance of increased supply of agricultural products to consumers was emphasized by the recent creation of a new Agro-Industrial Commission in the CMEA structure to be staffed by new personnel. In recent years, all the East European countries in their drive toward self-sufficiency in agricultural production have announced reform policies intended to encourage better use of resources and improve overall agricultural productivity. Indeed, most countries have announced and implemented to varying degrees incentives to increase agricultural production and output, particular-

ly on farmers' personal plots and private farms. Tangible progress in this area seems to be occurring since Gorbachev came to power.

This paper will concentrate on recent agricultural performance as indicated by independent measures for individual East European countries and for the area as a whole. Some comparisons will also be made with the U.S.S.R., Western Europe, and the United States, in an attempt better to appraise the role and performance of agriculture in the last 12 years. In another study of East European agriculture by Nancy Cochrane and Miles Lambert, the reader will find an excellent analysis of all aspects of agricultural reforms, trade, consumption, potential, and prospects.

II. AGRICULTURE'S CHANGING ROLE AND RESTRUCTURING

Agriculture, measured in terms of its share in total national employment and its share in the gross national product has been declining steadily in all East European countries during the whole postwar period. See Table 1. While in 1965, the agricultural labor force accounted for close to one-half or more of the total employment in several countries, by 1987, in all East European countries its share in the total, and agriculture's share in the GNP had decreased to below 30 percent. In the two more industrialized countries, the GDR and Czechoslovakia, agricultural employment has declined to only 10 and 12 percent of the total, respectively. It is interesting to note that in 1987 the GNP share of agriculture was larger than that of employment in the respective totals for several countries.¹ Eastern Europe as a whole has about one-fifth of its total labor force in agriculture and generates also about one-fifth of GNP in agriculture. Compared with the U.S.A., the relative importance of agriculture is 8 to 11 times larger in Eastern Europe as a percentage of total labor force and GNP, respectively.

TABLE 1.—AGRICULTURE'S SHARE IN TOTAL LABOR FORCE AND GNP

| | [In percent] | | | | | | | |
|--------------------------------|--------------|------|------|------|------------------------|-------------------|------|-------------------|
| | Labor force | | | | Gross national product | | | |
| | 1965 | 1975 | 1985 | 1987 | 1965 | 1975 ¹ | 1985 | 1987 ¹ |
| Bulgaria | 44.3 | 27.6 | 21.1 | 20.0 | 35.2 | 27.2 | 18.8 | 20.5 |
| Czechoslovakia | 19.5 | 3.9 | 12.3 | 12.0 | 17.6 | 15.6 | 15.0 | 15.3 |
| German Democratic Republic ... | 14.0 | 10.5 | 10.2 | 10.2 | 15.6 | 13.6 | 14.0 | 13.3 |
| Hungary | 27.2 | 20.1 | 19.5 | 18.4 | 25.2 | 25.0 | 24.3 | 24.2 |
| Poland | 38.1 | 32.1 | 29.8 | 29.1 | 29.0 | 26.2 | 28.1 | 26.2 |
| Romania | 57.4 | 38.8 | 28.7 | 28.1 | 41.4 | 25.5 | 27.8 | 29.5 |
| Yugoslavia | 49.7 | 38.5 | 22.6 | 22.0 | 25.5 | 17.2 | 14.6 | 14.5 |
| Eastern Europe | 37.2 | 28.2 | 22.3 | 21.8 | 25.3 | 21.8 | 20.8 | 20.5 |
| United States | 6.9 | 3.5 | 2.7 | 2.7 | 3.5 | 3.0 | 2.0 | 1.8 |

¹ Data for 1987 in all tables are preliminary.

Sources: East European countries; Labor force; Agricultural employment in terms of yearly averages or midyear data of economically active persons in agriculture, taken from statistical yearbooks of the respective countries. GNP: Calculated from Thad P. Alton and Assoc., OP-100, Tables 1-6. The shares were adjusted for forestry. Some data for 1987 were estimated from the plan fulfillment reports for 1987, reported by the statistical offices of the respective countries. U.S.A.: U.S. Department of Commerce, Statistical Abstract of the United States, 1976, pp. 356, 365, and 395, *ibid.*, 1988, pp. 366 and 368, and Survey of Current Business, No. 5, 1987, pp. 5, 38, and S-9.

¹ Returns to labor in agriculture have increased. In Czechoslovakia, for example, the average agricultural labor income was 5 percent higher than the average nonagricultural labor income in 1987. (Calculated from *Rude pravo*, Jan. 30, 1988.)

Restructuring of agriculture in several countries is aimed in part toward providing greater incentives to farmers to increase the output of farm products and achieve greater efficiency in the use of inputs. For example, Czechoslovakia has just adopted a new Law on Agricultural Cooperatives.² It permits, for the first time, the collective farms to engage directly in foreign trade, to cede land for specified periods for agricultural use to collective farmers or other citizens, and to entrust more independent decisionmaking to management of the collective farms.³

III. GROWTH AND STRUCTURE OF OUTPUT AND INPUTS IN THE 1980'S

Official country statistics publish on a regular basis measures of gross agricultural production, which include all intermediate products used on farms to further production.⁴ Our independently calculated agricultural output and input measures are comparable with Western measures;⁵ double count of intermediate products is excluded. A very brief summary of the coverage, concepts, and methodology of these measures is outlined in Appendix B. The reader will find the sources we used are for the most part official publications of the statistical offices of the countries of Eastern Europe; these and other sources are given in Appendix A. The quality and detail of statistical information underlying the output and input measures is best for Hungary and Poland, quite adequate for Czechoslovakia and Yugoslavia, barely adequate for Bulgaria and the GDR, and the least satisfactory for Romania. This qualitative distinction should be kept in mind when interpreting the various output and input measures of individual East European countries.

The basic measures of output and expenses for individual countries and for Eastern Europe as a whole for the 1975–87 period⁶ are shown in Tables 2 and 3. Agricultural output performance has been uneven among the countries, and within particular countries, over the last 12 years. From 1975 to 1987, the greatest increase in farm output occurred in Romania, with an increase of over 40 percent, followed by Czechoslovakia, Yugoslavia, Hungary, the GDR, and Bulgaria, in descending order. Poland showed no increase in output. Our caution about the quality of Romanian statistics should be noted here: it ranks lowest among the East European countries. In the 1970's, all the East European countries put heavy emphasis on rapid increases of livestock production in order to improve the quality of national diets. In the 1980's, however, the rate of growth of animal output slowed down substantially, due to decreased imports of feed.

² Czechoslovak Socialist Republic, *Sbirka zakonu*, 1988, No. 18, Law 90, June 15, 1988.

³ For detailed discussion on restructuring and reforms in Eastern Europe, see the study in the present volume, by N. Cochrane and M. Lambert, "Eastern European Agriculture: Pressures for Reforms in the Eighties."

⁴ Poland is the only country in Eastern Europe that computes agricultural output (*produkcja koncowca*) in a measure comparable with Western and FAO concepts.

⁵ For definitions of these concepts, see U.N., E.C.E., *Agricultural Sector Accounts and Tables: A Handbook of Definitions and Methods*, Geneva, 1956, and *European Handbook of Economic Accounts for Agriculture*, New York, 1983.

⁶ Measures of performance for earlier postwar years are given in G. Lazarcik, U.S. Congress, JEC, *Compendium 1974*, pp. 328–329, and *ibid.*, 1981, pp. 594–595.

TABLE 2 - GROWTH OF AGRICULTURAL OUTPUT
(Indexes 1975=100)

| | Agricultural Output | | | Agricultural Output | | | Agricultural Output | | | Agricultural Output | | |
|-------------------------------------|---------------------|--------|-----------------|---------------------|--------|-----------------|---------------------|--------|-----------------|---------------------|--------|-----------------|
| | Total | Crops | Animal Products | Total | Crops | Animal Products | Total | Crops | Animal Products | Total | Crops | Animal Products |
| BULGARIA | | | | | | | | | | | | |
| 1985 | 82.6 | 86.3 | 69.5 | 73.1 | 76.3 | 71.4 | 79.9 | 88.3 | 77.6 | 72.9 | 77.2 | 70.0 |
| 1970 | 90.6 | 101.9 | 79.8 | 87.6 | 92.9 | 85.9 | 84.9 | 95.0 | 82.1 | 79.6 | 76.4 | 82.2 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 105.9 | 96.8 | 114.6 | 109.5 | 102.5 | 111.8 | 107.2 | 112.5 | 105.6 | 115.8 | 119.3 | 113.4 |
| 1981 | 111.8 | 104.5 | 116.9 | 108.6 | 101.1 | 111.0 | 108.8 | 117.7 | 106.1 | 112.9 | 110.3 | 114.7 |
| 1982 | 118.0 | 114.1 | 121.7 | 110.5 | 121.2 | 107.1 | 102.9 | 118.1 | 88.3 | 123.9 | 129.3 | 120.2 |
| 1983 | 110.5 | 94.0 | 126.3 | 115.7 | 116.9 | 115.4 | 106.5 | 116.3 | 103.4 | 122.1 | 115.0 | 126.9 |
| 1984 | 114.7 | 102.3 | 126.6 | 116.7 | 122.2 | 117.5 | 112.1 | 123.0 | 108.7 | 127.2 | 125.6 | 128.2 |
| 1985 | 106.2 | 87.8 | 123.9 | 116.2 | 115.6 | 119.1 | 116.7 | 132.6 | 111.8 | 117.8 | 117.2 | 118.3 |
| 1986 | 112.6 | 93.6 | 130.9 | 122.2 | 120.9 | 122.7 | 116.9 | 123.0 | 115.0 | 121.1 | 123.2 | 119.7 |
| 1987 | 108.1 | 86.7 | 126.7 | 123.5 | 113.3 | 126.8 | 117.9 | 128.9 | 114.2 | 119.8 | 116.3 | 120.9 |
| Average annual rate of growth (%) * | | | | | | | | | | | | |
| 1985-70 | 1.06% | 0.07% | 2.40% | 3.09% | 1.85% | 3.56% | 0.97% | -0.19% | 1.34% | 2.30% | 1.34% | 2.88% |
| 1970-75 | 1.69% | -0.41% | 4.02% | 3.12% | 2.59% | 3.30% | 3.56% | 1.33% | 4.22% | 4.75% | 5.54% | 4.21% |
| 1975-80 | 1.45% | -0.58% | 3.31% | 1.93% | 1.03% | 2.21% | 1.50% | 3.06% | 0.97% | 3.22% | 3.07% | 3.30% |
| 1980-85 | 0.08% | -2.10% | 1.77% | 2.00% | 3.29% | 1.62% | 1.58% | 2.72% | 1.19% | 1.24% | 0.54% | 1.72% |
| 1986 | 6.04% | 6.56% | 5.67% | 3.38% | 4.61% | 3.01% | 0.17% | -7.22% | 2.88% | 2.79% | 5.16% | 1.19% |
| 1987 | -4.00% | -7.40% | -1.68% | 1.07% | -6.30% | 3.40% | 0.66% | 5.54% | -0.68% | -1.05% | -4.00% | 1.00% |
| POLAND | | | | | | | | | | | | |
| 1985 | 77.7 | 89.4 | 72.9 | 68.7 | 79.9 | 60.4 | 74.5 | 79.3 | 71.0 | 75.7 | 84.4 | 71.3 |
| 1970 | 84.6 | 100.1 | 78.6 | 75.1 | 76.8 | 73.8 | 85.3 | 91.6 | 80.7 | 83.6 | 80.9 | 80.2 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 96.3 | 84.1 | 101.2 | 117.0 | 114.9 | 118.5 | 113.9 | 112.3 | 115.1 | 107.3 | 104.3 | 106.9 |
| 1981 | 89.3 | 102.6 | 83.9 | 112.2 | 112.1 | 112.3 | 116.3 | 119.3 | 118.5 | 105.3 | 108.7 | 103.5 |
| 1982 | 84.1 | 98.2 | 92.4 | 117.7 | 115.1 | 104.7 | 123.5 | 126.4 | 119.9 | 108.2 | 118.1 | 104.2 |
| 1983 | 90.3 | 103.1 | 85.2 | 118.9 | 124.5 | 114.7 | 123.6 | 127.7 | 121.0 | 108.7 | 113.8 | 106.1 |
| 1984 | 96.5 | 111.3 | 83.3 | 132.6 | 149.1 | 120.3 | 123.1 | 121.8 | 124.1 | 114.9 | 122.5 | 111.0 |
| 1985 | 99.7 | 107.2 | 96.7 | 127.6 | 133.4 | 123.2 | 115.3 | 108.5 | 120.3 | 112.7 | 114.8 | 111.7 |
| 1986 | 104.1 | 110.4 | 101.5 | 141.3 | 161.5 | 126.3 | 126.1 | 131.1 | 122.5 | 116.5 | 124.6 | 115.4 |
| 1987 | 98.4 | 100.0 | 97.8 | 144.4 | 168.7 | 126.3 | 121.4 | 119.9 | 122.5 | 116.5 | 120.3 | 114.6 |
| Average annual rate of growth (%) * | | | | | | | | | | | | |
| 1985-70 | 1.41% | 1.43% | 1.39% | 1.21% | -0.69% | 2.91% | 2.36% | 2.70% | 2.07% | 1.69% | 1.02% | 2.10% |
| 1970-75 | 4.14% | 0.38% | 5.83% | 5.47% | 4.46% | 6.27% | 3.80% | 2.38% | 4.95% | 3.93% | 2.12% | 4.91% |
| 1975-80 | 0.25% | -2.59% | 1.39% | 2.64% | 1.60% | 3.50% | 2.16% | 1.11% | 2.94% | 1.63% | 0.62% | 2.16% |
| 1980-85 | 1.23% | 4.40% | 0.02% | 2.73% | 4.44% | 1.42% | 0.67% | 0.11% | 1.06% | 1.44% | 2.27% | 1.02% |
| 1986 | 4.35% | 3.00% | 5.00% | 10.77% | 21.09% | 2.47% | 9.39% | 20.63% | 1.84% | 5.16% | 6.77% | 3.30% |
| 1987 | -5.47% | -9.50% | -3.70% | 2.16% | 4.40% | 0.03% | -3.73% | -8.50% | 0.00% | -1.67% | -3.43% | -0.69% |

Sources: See Appendix A. Indexes were calculated from physical quantities weighted by 1978 U.S. dollars.

* Growth rates in all tables were calculated by least squares fit of $I_{n+1} = I_n(1+R)^n$

TABLE 3 - GROWTH OF OPERATING EXPENSES INCLUDING DEPRECIATION, OF GROSS PRODUCT AND NET PRODUCT OF AGRICULTURE
(Indexes 1975=100)

| | Expenses and Depre- ciation | Gross Product | Net Product | Expenses and Depre- ciation | Gross Product | Net Product | Expenses and Depre- ciation | Gross Product | Net Product | Expenses and Depre- ciation | Gross Product | Net Product |
|--------------------------------------|-----------------------------------|------------------|----------------|-----------------------------------|------------------|----------------|-----------------------------------|------------------|----------------|-----------------------------------|------------------|----------------|
| BULGARIA | | | | | | | | | | | | |
| 1985 | 57.6 | 80.4 | 95.9 | 84.0 | 84.0 | 87.7 | 55.2 | 82.8 | 89.1 | 48.4 | 86.3 | 91.8 |
| 1970 | 90.9 | 88.6 | 90.5 | 84.2 | 89.9 | 93.0 | 71.9 | 81.4 | 85.0 | 69.4 | 84.9 | 87.9 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 204.9 | 83.9 | 78.8 | 119.3 | 105.7 | 100.9 | 118.7 | 103.6 | 100.6 | 128.6 | 110.1 | 105.2 |
| 1981 | 216.7 | 88.6 | 81.1 | 134.6 | 85.1 | 85.5 | 116.7 | 106.4 | 103.3 | 125.0 | 108.4 | 102.9 |
| 1982 | 228.9 | 93.2 | 85.5 | 128.1 | 104.5 | 95.0 | 105.8 | 105.1 | 101.0 | 131.7 | 122.0 | 117.4 |
| 1983 | 245.8 | 80.9 | 70.8 | 138.5 | 106.5 | 95.5 | 107.5 | 110.0 | 105.8 | 135.9 | 118.5 | 110.7 |
| 1984 | 233.5 | 89.6 | 79.9 | 133.4 | 117.2 | 105.6 | 106.0 | 119.8 | 116.3 | 138.0 | 123.2 | 118.2 |
| 1985 | 253.5 | 75.1 | 83.0 | 140.2 | 112.8 | 98.7 | 110.1 | 125.5 | 121.4 | 130.0 | 112.6 | 107.7 |
| 1986 | 233.9 | 88.6 | 77.1 | 145.8 | 116.8 | 101.3 | 113.6 | 122.9 | 119.2 | 131.0 | 117.1 | 112.9 |
| 1987 | 227.7 | 86.0 | 73.0 | 147.8 | 119.4 | 102.0 | 114.5 | 124.4 | 120.3 | 129.6 | 116.0 | 111.7 |
| Average annual rate of growth (%) ** | | | | | | | | | | | | |
| 1965-70 | 9.37% | -1.35% | -2.12% | 4.39% | 1.55% | 1.38% | 4.54% | -0.23% | -0.77% | 7.85% | 0.30% | -0.22% |
| 1970-75 | 1.88% | 2.03% | 1.55% | 4.07% | 2.39% | 1.72% | 5.84% | 2.75% | 2.78% | 7.76% | 3.45% | 2.68% |
| 1975-80 | 14.89% | -2.82% | -4.15% | 3.75% | 1.20% | 0.19% | 2.03% | 1.98% | 1.15% | 5.63% | 1.93% | 1.04% |
| 1980-85 | 3.96% | -1.88% | -3.44% | 2.48% | 2.82% | 1.53% | -1.59% | 3.96% | 3.91% | 1.10% | 1.29% | 1.38% |
| 1986 | -7.71% | 17.91% | 22.24% | 3.97% | 3.53% | 2.66% | 3.24% | -2.05% | -1.77% | 0.74% | 3.96% | 4.84% |
| 1987 | -2.66% | -2.91% | -5.21% | 1.39% | 2.19% | 0.67% | 0.82% | 1.26% | 0.89% | -1.04% | -0.92% | -1.07% |
| POLAND | | | | | | | | | | | | |
| 1985 | 46.9 | 99.1 | 104.2 | 39.0 | 91.4 | 100.3 | 69.2 | 75.3 | 75.5 | 51.5 | 89.8 | 94.3 |
| 1970 | 70.3 | 95.2 | 97.4 | 59.0 | 88.7 | 82.2 | 77.3 | 86.8 | 86.9 | 72.4 | 90.3 | 92.5 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 107.5 | 93.4 | 89.1 | 124.5 | 115.0 | 108.9 | 130.0 | 111.4 | 110.8 | 121.9 | 102.3 | 98.2 |
| 1981 | 83.3 | 97.7 | 93.1 | 119.2 | 113.3 | 104.9 | 126.6 | 114.9 | 114.3 | 115.9 | 103.6 | 98.6 |
| 1982 | 87.0 | 103.1 | 96.7 | 124.9 | 118.5 | 109.9 | 123.5 | 124.2 | 123.5 | 116.5 | 109.7 | 104.8 |
| 1983 | 88.9 | 108.4 | 104.1 | 128.9 | 121.5 | 108.2 | 140.2 | 121.5 | 120.7 | 115.8 | 110.2 | 104.3 |
| 1984 | 82.9 | 112.7 | 108.5 | 142.4 | 136.2 | 122.2 | 126.1 | 123.6 | 122.6 | 120.4 | 117.5 | 111.5 |
| 1985 | 86.3 | 112.8 | 108.4 | 130.9 | 140.8 | 124.0 | 125.4 | 114.0 | 113.4 | 120.7 | 114.6 | 107.8 |
| 1986 | 86.2 | 118.4 | 114.3 | 145.7 | 153.1 | 136.6 | 123.8 | 127.3 | 126.6 | 124.6 | 121.5 | 114.7 |
| 1987 | 97.1 | 105.0 | 99.2 | 147.9 | 159.2 | 140.5 | 147.4 | 117.7 | 116.5 | 128.8 | 117.0 | 108.8 |
| Average annual rate of growth (%) ** | | | | | | | | | | | | |
| 1965-70 | 11.65% | -2.44% | -3.11% | 8.50% | -0.97% | -2.33% | 2.31% | 2.45% | 2.40% | 7.65% | -0.44% | -1.04% |
| 1970-75 | 8.79% | 1.50% | 1.11% | 11.30% | 1.58% | 0.82% | 7.60% | 3.07% | 3.05% | 7.22% | 2.27% | 1.91% |
| 1975-80 | 2.94% | -0.70% | -1.55% | 3.91% | 2.42% | 1.31% | 4.12% | 1.85% | 1.74% | 4.11% | 0.73% | -0.05% |
| 1980-85 | -3.76% | 4.14% | 4.36% | 2.35% | 4.62% | 3.16% | -0.19% | 0.89% | 0.86% | 0.17% | 2.76% | 2.38% |
| 1986 | 2.23% | 4.94% | 5.48% | 11.29% | 8.73% | 10.18% | -1.31% | 11.66% | 11.65% | 3.16% | 5.99% | 6.60% |
| 1987 | 10.07% | -11.34% | -13.20% | 1.54% | 4.01% | 2.88% | 19.09% | -7.55% | -7.99% | 3.40% | -3.84% | -5.11% |

Sources: See Appendix A.

On the side of inputs, operating expenses and depreciation grew at a faster rate than output over the period under study. However, in the 1980's their growth slowed down substantially, showing, for the 1980-85 period, only 0.2 percent average annual rate of growth, compared to 1.4 percent growth in output. This declining trend in inputs points to more efficient use of production inputs purchased from outside agriculture. Since these inputs are subtracted from output to obtain the gross and net products of agriculture, the recent slower increases in inputs in relation to increases in output have resulted in better performance for both gross and net products in the eighties than in the earlier period. The interrelationship of output, inputs, and gross and net product can be followed country by country in Tables 2 and 3.

IV. PER CAPITA TRENDS AND LEVELS OF OUTPUT

The trends in output per capita are, in general, similar to the total output measures except that the rates of change are slowed down by increases in population in most countries. From 1975 to 1987, Romania, Hungary, the GDR, Czechoslovakia, and Yugoslavia had above average growth of per capita output, 30, 27, 20, 17, and 11 percent, respectively, followed by Bulgaria with 5 percent growth, and Poland with 11 percent decrease; the region as a whole experienced 9 percent growth.

Per capita country comparisons of levels of output and gross and net product in agriculture in relation to the overall East European level are shown in Table 4. These findings show that for the 1981-87 period the per capita levels of agricultural output were below the average level for Eastern Europe in Czechoslovakia, Poland, Romania, and Yugoslavia, while in Bulgaria, Hungary, and the German Democratic Republic, they were significantly above the average. Hungary continues to be the highest per capita producer of agricultural output. Bulgaria and Hungary ranked highest in per capita output of crops, while the GDR, Hungary and Czechoslovakia excelled in per capita output of animal products. The levels of gross and net product per capita follow roughly the output pattern for individual countries.

TABLE 4.—PER CAPITA COMPARISONS OF LEVELS OF OUTPUT, AND GROSS AND NET PRODUCT IN AGRICULTURE

[Eastern Europe = 100]

| | Agricultural output | | | | Crop output | | | | Animal output | | | | Gross product | | | | Net product | | | |
|---------------------------------|---------------------|---------|---------|---------|-------------|---------|---------|---------|---------------|---------|---------|---------|---------------|---------|---------|---------|-------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 |
| Bulgaria..... | 115.9 | 110.7 | 117.0 | 109.0 | 176.0 | 152.0 | 144.3 | 123.5 | 83.8 | 89.2 | 101.9 | 101.1 | 120.8 | 128.4 | 111.5 | 107.2 | 122.4 | 125.0 | 104.3 | 98.0 |
| Czechoslovakia..... | 95.6 | 92.5 | 98.5 | 99.7 | 63.2 | 62.5 | 67.8 | 65.4 | 112.9 | 108.1 | 115.3 | 118.4 | 74.2 | 80.5 | 80.7 | 83.3 | 64.4 | 77.9 | 74.6 | 74.8 |
| German Democratic Republic..... | 108.2 | 120.1 | 126.2 | 129.3 | 69.2 | 90.4 | 93.2 | 93.3 | 129.0 | 135.5 | 144.3 | 148.9 | 108.7 | 115.2 | 127.3 | 131.8 | 106.6 | 111.9 | 126.5 | 132.7 |
| Hungary..... | 120.1 | 128.0 | 141.1 | 134.6 | 143.9 | 150.7 | 158.4 | 154.3 | 107.4 | 116.2 | 131.6 | 123.9 | 115.9 | 112.6 | 120.8 | 114.9 | 116.2 | 110.5 | 121.0 | 117.3 |
| Poland..... | 109.3 | 101.2 | 89.7 | 89.1 | 90.3 | 85.2 | 80.3 | 75.5 | 119.4 | 109.4 | 94.8 | 96.5 | 108.0 | 100.2 | 97.7 | 93.9 | 111.1 | 102.3 | 100.8 | 97.7 |
| Romania..... | 85.5 | 91.5 | 91.5 | 100.5 | 110.4 | 113.7 | 117.9 | 140.4 | 73.8 | 80.1 | 77.0 | 78.8 | 82.9 | 84.0 | 79.6 | 91.7 | 76.7 | 79.3 | 70.6 | 80.9 |
| Yugoslavia..... | 78.5 | 78.6 | 80.9 | 77.2 | 102.5 | 97.7 | 95.9 | 93.9 | 65.7 | 68.6 | 72.7 | 68.2 | 98.9 | 100.0 | 102.6 | 96.9 | 107.7 | 108.0 | 114.2 | 108.9 |
| Eastern Europe..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Sources: Calculated from physical quantities weighted by 1978 U.S. dollars, divided by population data (see Appendix A).

V. PRODUCTIVITY OF LAND AND LIVESTOCK

In most East European countries, the area of agricultural land⁷ remained relatively stable during the 1975-87 period. In Czechoslovakia, the GDR, Hungary, Poland, and Yugoslavia, agricultural land declined by 2 to 6 percent, while in Bulgaria and Romania it increased by 1 to 6 percent in the same period.⁸

In comparison to the U.S. standards, the agricultural land per person employed in agriculture is very small in the East European countries. By 1987, the number of hectares per person employed in agriculture ranged from 3.8 in Poland to 7.1 in the GDR and Czechoslovakia, with 5.4 hectares the average for all Eastern Europe. In general, the productivity of land increased in all the countries. However, the economically less-developed countries, except Bulgaria, had the larger annual rates of increase because their production per unit of land was low in the earlier postwar years. Lower 1987 crop harvests registered decreases in crop output per unit of land in most countries because of less favorable weather conditions.

Relative levels of productivity of land in relation to the East European average as a base are shown in Table 5. Over the postwar period the differences among countries in productivity of land have been reduced, but in 1981-87 they were still very large, and they were greater in the output of animal products than in that of crops. In 1986-87, for example, the GDR produced more than three times as much animal products per hectare as Romania or Yugoslavia, and more than twice that of Poland. Levels of animal output were substantially higher in the more industrialized countries. Output measures, of course, are affected by the trend in inputs, and imports of feedstuffs and other expense items enter here.

⁷ Agricultural land comprises all arable land, orchards, gardens, vineyards, permanent and temporary meadows, pastures, and grazing land.

⁸ See Soviet *Ekonomicheskoi vzaimopomoshchi. Sekretariat. Statisticheskii Ehagodnik Stran-Chlenov . . . 1982*, Moscow, 1982, p. 178, *ibid.*, 1987, p. 168, and national statistical yearbooks.

TABLE 5.—COMPARISONS OF LEVELS OF OUTPUT, EXPENSES INCLUDING DEPRECIATION, GROSS AND NET PRODUCT PER HECTARE OF LAND IN AGRICULTURE

(Total Eastern Europe=100)

| | Agricultural output | | | | Crop output | | | | Animal output | | | |
|---------------------------------|---------------------|---------|---------|---------|-------------|---------|---------|---------|---------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 |
| Bulgaria | 99.4 | 90.0 | 93.7 | 86.1 | 151.0 | 123.7 | 115.5 | 97.6 | 71.9 | 72.5 | 81.6 | 79.8 |
| Czechoslovakia | 117.7 | 115.2 | 122.9 | 124.1 | 77.9 | 77.8 | 84.7 | 81.4 | 138.9 | 134.6 | 144.0 | 147.3 |
| German Democratic Republic..... | 173.8 | 183.4 | 186.5 | 188.1 | 111.2 | 138.1 | 137.8 | 135.8 | 207.1 | 206.9 | 213.4 | 216.6 |
| Hungary | 109.5 | 116.8 | 127.0 | 119.2 | 131.3 | 137.5 | 142.6 | 136.6 | 98.0 | 106.0 | 118.5 | 109.7 |
| Poland | 112.5 | 106.3 | 96.2 | 97.0 | 92.9 | 89.5 | 86.1 | 82.2 | 122.9 | 115.0 | 101.7 | 105.1 |
| Romania | 72.0 | 76.5 | 76.2 | 83.1 | 91.8 | 95.0 | 98.2 | 116.1 | 61.4 | 66.9 | 64.1 | 65.1 |
| Yugoslavia | 67.5 | 68.8 | 71.5 | 69.1 | 88.1 | 85.6 | 84.7 | 84.0 | 56.5 | 60.1 | 64.2 | 60.9 |
| Eastern Europe | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

| | Expenses including depreciation | | | | Gross product | | | | Net product | | | |
|---------------------------------|---------------------------------|---------|---------|---------|---------------|---------|---------|---------|-------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 |
| Bulgaria | 90.9 | 73.0 | 108.2 | 98.3 | 103.7 | 104.4 | 89.3 | 84.7 | 105.1 | 101.7 | 83.5 | 77.4 |
| Czechoslovakia | 176.0 | 141.7 | 165.5 | 167.8 | 91.3 | 100.3 | 100.8 | 103.6 | 79.2 | 97.0 | 93.1 | 93.0 |
| German Democratic Republic..... | 177.4 | 201.5 | 185.9 | 181.2 | 174.6 | 175.9 | 188.2 | 191.7 | 171.3 | 171.0 | 187.0 | 193.1 |
| Hungary | 115.0 | 140.1 | 152.9 | 140.7 | 105.7 | 102.7 | 108.8 | 101.7 | 106.3 | 100.8 | 108.9 | 103.9 |
| Poland | 109.8 | 104.7 | 79.2 | 83.9 | 111.1 | 105.3 | 104.8 | 102.3 | 114.2 | 107.4 | 108.1 | 106.4 |
| Romania | 84.4 | 91.4 | 101.1 | 105.9 | 68.9 | 70.2 | 66.3 | 75.8 | 63.8 | 66.3 | 58.8 | 66.9 |
| Yugoslavia | 29.4 | 31.2 | 29.6 | 29.2 | 85.0 | 87.6 | 90.6 | 86.6 | 92.6 | 94.6 | 100.9 | 97.4 |
| Eastern Europe | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

There have been also large differences in inputs per hectare among East European countries. Czechoslovakia's and the GDR's levels were more than twice as large as Poland's and about six times that of Yugoslavia's in 1986-87. The use of nonagricultural inputs per unit of land in the more advanced countries was far higher than in the less-advanced countries. Differences in levels of gross and net product per hectare among countries were also very large.

In the last 20 years an effort has been made to improve the productivity of land, and in most of the East European countries yields of major crops and livestock products have increased substantially. However, in the last 8 years the improvement in yields slowed down. Overall, the yields were still substantially below those of the Federal Republic of Germany in 1986-87.

VI. PRODUCTIVITY OF LABOR IN AGRICULTURE

The quality of agricultural labor statistics varies from country to country. The GDR's, Czechoslovak, Hungarian, and Polish labor data are more homogeneous, while those for the other East European countries are less standardized, and consequently the quality of labor units is less homogeneous. With a steady decline in the agricultural labor force, output per unit of labor in agriculture increased sharply during the postwar period. Table 6 summarizes trends in the labor productivity by country and region from 1965 to 1987. Yugoslavia, Romania, Bulgaria, Hungary, and Czechoslovakia had the largest increases in output per unit of labor during this period; they were followed by the GDR and Poland. In Eastern Europe as a whole, agricultural output per unit of labor increased about 39 percent from 1975 to 1987. The increases in inputs per worker in agriculture were very impressive in some countries, followed by gross and net product. On the whole East European performance per unit of labor reflects largely the reduction of extensive disguised agricultural unemployment by transfers of labor to nonagricultural sectors of the economy, permitting better overall use of available labor resources.

TABLE 6 - GROWTH OF AGRICULTURAL OUTPUT PER PERSON EMPLOYED IN AGRICULTURE
(Indexes 1975 = 100)

| | Agricultural Output | | | Agricultural Output | | | Agricultural Output | | | Agricultural Output | | |
|---------|------------------------------------|--------|-----------------|-----------------------|--------|-----------------|-----------------------------------|--------|-----------------|-----------------------|--------|-----------------|
| | Total | Crope | Animal Products | Total | Crope | Animal Products | Total | Crope | Animal Products | Total | Crope | Animal Products |
| | BULGARIA | | | CZECHOSLOVAKIA | | | GERMAN DEMOCRATIC REPUBLIC | | | HUNGARY | | |
| 1985 | 55.5 | 64.6 | 46.7 | 59.4 | 63.6 | 58.1 | 60.1 | 66.5 | 58.4 | 59.0 | 62.4 | 56.6 |
| 1970 | 73.7 | 82.9 | 64.9 | 78.2 | 80.7 | 74.7 | 75.6 | 84.7 | 73.2 | 69.3 | 66.3 | 71.3 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 121.3 | 110.9 | 131.3 | 117.7 | 110.1 | 120.1 | 109.5 | 114.9 | 107.8 | 120.2 | 123.9 | 117.8 |
| 1981 | 130.1 | 121.6 | 138.4 | 116.7 | 108.6 | 119.3 | 110.5 | 119.6 | 107.7 | 116.3 | 113.6 | 116.2 |
| 1982 | 141.3 | 136.6 | 145.8 | 119.7 | 131.2 | 116.0 | 104.0 | 119.3 | 99.3 | 124.9 | 130.3 | 121.2 |
| 1983 | 136.5 | 118.1 | 156.0 | 127.0 | 128.3 | 126.6 | 106.2 | 116.1 | 103.2 | 122.1 | 115.0 | 126.9 |
| 1984 | 146.2 | 130.4 | 161.4 | 129.1 | 133.0 | 127.9 | 110.4 | 121.1 | 107.1 | 130.3 | 126.6 | 131.2 |
| 1985 | 136.8 | 114.7 | 161.9 | 126.0 | 125.1 | 126.9 | 114.0 | 129.6 | 109.2 | 125.4 | 124.7 | 125.9 |
| 1986 | 150.7 | 125.2 | 175.1 | 133.0 | 131.5 | 133.5 | 113.9 | 119.8 | 112.0 | 132.9 | 135.2 | 131.3 |
| 1987 | 148.0 | 118.6 | 176.2 | 134.6 | 123.4 | 138.2 | 114.8 | 126.4 | 111.2 | 135.6 | 133.9 | 136.8 |
| | Average annual rates of growth (%) | | | | | | | | | | | |
| 1965-70 | 5.06% | 4.04% | 6.45% | 4.59% | 3.34% | 5.07% | 4.58% | 3.38% | 4.97% | 3.66% | 2.69% | 4.25% |
| 1970-75 | 5.74% | 3.56% | 6.16% | 6.22% | 5.68% | 6.41% | 6.06% | 3.77% | 6.73% | 7.66% | 6.68% | 7.31% |
| 1975-80 | 4.12% | 2.04% | 6.03% | 3.47% | 2.56% | 3.76% | 1.83% | 3.42% | 1.30% | 3.92% | 3.77% | 4.00% |
| 1980-85 | 2.87% | 0.63% | 4.61% | 2.26% | 3.55% | 1.86% | 0.63% | 1.76% | 0.25% | 1.52% | 0.82% | 2.00% |
| 1986 | 6.55% | 9.10% | 8.17% | 3.94% | 5.16% | 3.56% | -0.17% | -7.53% | 2.53% | 5.98% | 8.44% | 4.34% |
| 1987 | -1.78% | -5.27% | 0.59% | 1.18% | -6.20% | 3.51% | 0.66% | 5.54% | -0.69% | 2.01% | -1.03% | 4.13% |
| | POLAND | | | ROMANIA | | | YUGOSLAVIA | | | EASTERN EUROPE | | |
| 1985 | 71.4 | 82.1 | 67.0 | 49.3 | 57.3 | 43.3 | 56.9 | 60.6 | 54.3 | 59.7 | 66.5 | 56.2 |
| 1970 | 79.1 | 93.4 | 73.3 | 59.6 | 60.9 | 56.6 | 71.5 | 76.8 | 67.7 | 71.6 | 77.9 | 68.7 |
| 1975 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1980 | 91.0 | 79.5 | 95.7 | 147.6 | 145.0 | 149.6 | 144.5 | 142.5 | 146.0 | 118.4 | 115.1 | 120.1 |
| 1981 | 83.5 | 95.9 | 78.4 | 145.6 | 145.4 | 145.8 | 156.0 | 152.0 | 159.9 | 117.5 | 121.3 | 115.6 |
| 1982 | 86.4 | 82.3 | 86.8 | 154.2 | 177.1 | 137.2 | 174.3 | 161.3 | 169.3 | 123.5 | 134.7 | 117.6 |
| 1983 | 86.7 | 99.0 | 81.8 | 155.4 | 162.8 | 149.9 | 162.1 | 167.6 | 177.9 | 124.7 | 130.0 | 121.9 |
| 1984 | 96.4 | 109.0 | 91.3 | 172.0 | 193.4 | 156.1 | 166.7 | 164.7 | 166.1 | 133.7 | 142.6 | 129.2 |
| 1985 | 97.7 | 105.1 | 94.8 | 165.4 | 173.0 | 159.6 | 176.4 | 167.6 | 166.1 | 132.0 | 134.3 | 130.9 |
| 1986 | 103.3 | 109.6 | 100.8 | 163.2 | 209.5 | 163.7 | 197.1 | 204.9 | 191.5 | 140.3 | 147.5 | 136.6 |
| 1987 | 97.6 | 99.3 | 97.2 | 167.6 | 219.2 | 164.2 | 190.2 | 167.9 | 191.9 | 136.6 | 143.1 | 136.3 |
| | Average annual rates of growth (%) | | | | | | | | | | | |
| 1965-70 | 1.72% | 1.73% | 1.70% | 3.27% | 1.34% | 5.00% | 4.29% | 4.61% | 3.97% | 3.41% | 2.73% | 3.62% |
| 1970-75 | 5.18% | 1.39% | 6.90% | 10.46% | 9.42% | 11.30% | 7.62% | 6.15% | 6.61% | 7.08% | 5.22% | 6.09% |
| 1975-80 | -0.94% | -3.74% | 0.16% | 7.50% | 6.31% | 8.40% | 7.14% | 6.04% | 7.96% | 3.60% | 2.57% | 4.14% |
| 1980-85 | 2.23% | 5.43% | 1.01% | 3.12% | 4.63% | 1.60% | 4.76% | 4.19% | 5.19% | 2.74% | 3.55% | 2.33% |
| 1986 | 5.70% | 4.30% | 6.33% | 10.77% | 21.09% | 2.47% | 10.52% | 22.07% | 2.89% | 6.23% | 9.65% | 4.33% |
| 1987 | -5.35% | -9.39% | -3.58% | 2.40% | 4.64% | 0.26% | -3.51% | -8.29% | 0.23% | -1.18% | -2.96% | -0.20% |

Sources: Data in Table 2 divided by indexes of agricultural employment given in the statistical yearbooks of respective countries (see Appendix A).

* The definition and derivation of agricultural output are explained in section III.

Comparative levels of productivity of labor among the different countries in relation to the East European average are shown in Table 7. Very large differences in productivity of labor continue to exist among the individual countries. As of 1986-87 the Polish and Romanian worker still produced less than one-third of the GDR output per worker. Czechoslovakia has been the second highest in output per worker, followed by Hungary, Bulgaria, Yugoslavia, Romania, and Poland, on a steeply descending scale. The differences in relative levels of gross and net product per worker were approximately of the same order of magnitude as in the case of output.

TABLE 7.—COMPARISONS OF LEVELS OF OUTPUT, EXPENSES INCLUDING DEPRECIATION, GROSS AND NET PRODUCT PER PERSON EMPLOYED IN AGRICULTURE

[Total Eastern Europe=100]

| | Agricultural output | | | | Crop output | | | | Animal output | | | |
|---------------------------------|---------------------|---------|---------|---------|-------------|---------|---------|---------|---------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 |
| Bulgaria..... | 105.7 | 106.5 | 114.8 | 112.1 | 160.3 | 146.2 | 141.4 | 127.1 | 76.6 | 85.9 | 100.2 | 104.0 |
| Czechoslovakia | 179.4 | 168.8 | 170.1 | 166.2 | 118.9 | 114.1 | 117.2 | 109.0 | 211.5 | 197.1 | 199.2 | 197.3 |
| German Democratic Republic..... | 287.4 | 282.5 | 260.4 | 247.4 | 184.0 | 212.8 | 192.4 | 178.6 | 342.4 | 318.5 | 297.9 | 284.9 |
| Hungary | 159.4 | 162.0 | 159.6 | 156.8 | 191.1 | 190.9 | 179.1 | 179.7 | 142.4 | 147.1 | 148.8 | 144.3 |
| Poland | 98.3 | 82.1 | 68.5 | 68.9 | 81.3 | 69.3 | 61.3 | 58.4 | 107.3 | 88.8 | 72.4 | 74.6 |
| Romania | 58.1 | 68.6 | 72.4 | 76.7 | 74.1 | 85.1 | 93.3 | 107.2 | 49.6 | 60.0 | 60.9 | 60.1 |
| Yugoslavia | 63.0 | 69.7 | 85.2 | 85.2 | 82.2 | 86.6 | 100.9 | 103.6 | 52.8 | 60.9 | 76.5 | 75.2 |
| Eastern Europe..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

| | Expenses including depreciation | | | | Gross product | | | | Net product | | | |
|---------------------------------|---------------------------------|---------|---------|---------|---------------|---------|---------|---------|-------------|---------|---------|---------|
| | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 | 1971-75 | 1976-80 | 1981-85 | 1986-87 |
| Bulgaria..... | 96.3 | 86.7 | 133.0 | 128.1 | 110.4 | 123.3 | 109.3 | 110.3 | 111.9 | 120.0 | 102.1 | 100.8 |
| Czechoslovakia | 267.8 | 207.5 | 228.9 | 224.7 | 139.2 | 147.0 | 139.4 | 138.8 | 120.8 | 142.1 | 128.8 | 124.6 |
| German Democratic Republic..... | 292.8 | 310.0 | 259.8 | 238.3 | 289.1 | 271.0 | 262.5 | 252.2 | 283.7 | 263.5 | 260.8 | 254.0 |
| Hungary | 167.1 | 194.1 | 192.1 | 185.2 | 153.9 | 142.6 | 136.6 | 133.8 | 154.2 | 140.0 | 136.8 | 136.7 |
| Poland | 95.9 | 80.7 | 56.3 | 59.5 | 97.1 | 81.4 | 74.6 | 72.7 | 99.9 | 83.1 | 77.0 | 75.5 |
| Romania | 68.3 | 82.2 | 96.0 | 97.8 | 55.5 | 62.8 | 63.0 | 70.0 | 51.3 | 59.3 | 55.8 | 61.8 |
| Yugoslavia | 27.4 | 31.5 | 35.3 | 36.0 | 79.4 | 88.7 | 108.0 | 106.9 | 86.6 | 95.9 | 120.2 | 120.2 |
| Eastern Europe..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Sources: Calculated from physical quantities weighted by 1978 U.S. dollars divided by the number of persons employed in agriculture taken from statistical yearbooks of respective countries (see Appendix A).

VII. PROGRESS IN AGRICULTURAL TECHNOLOGY

A widely used indicator of the extent of mechanization is the number of tractors or amount of tractor horsepower per unit of land and per unit of labor. Table 8 presents amount of available tractor horsepower per 1,000 hectares of agricultural land and per 1,000 workers in agriculture by country and major regions. Our findings show that in the 1985-87 period the extent of the use of mechanical power was still low, by West European standards, in most of the East European countries. Only the GDR, Czechoslovakia, and Poland were close to West European levels. However, the level of West European mechanization was, in turn, low in comparison to that of the United States, where the amount of tractor horsepower per 1,000 full-time workers in agriculture was 99,840 in 1985.⁹

⁹ U.S. Dept. of Commerce, *Statistical Abstract of the United States*, 1987, pp. 619 and 637.

TABLE 8.—TRACTOR HORSEPOWER PER 1,000 HECTARES OF AGRICULTURAL LAND AND PER 1,000 WORKERS IN AGRICULTURE, 1973-87

[3-year averages]

| | Amount of tractor horsepower | | | | | Eastern Europe=100 | | | | | Indexes 1973-76 = 100 | | | | |
|------------------------------------|------------------------------|---------|---------|---------|---------|--------------------|---------|---------|---------|---------|-----------------------|---------|---------|---------|---------|
| | 1973-76 | 1976-79 | 1979-82 | 1982-85 | 1985-87 | 1973-76 | 1976-79 | 1979-82 | 1982-85 | 1985-87 | 1973-76 | 1976-79 | 1979-82 | 1982-85 | 1985-87 |
| Bulgaria: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 534 | 602 | 632 | 641 | 615 | 82 | 75 | 64 | 53 | 45 | 100 | 113 | 118 | 120 | 115 |
| Per 1,000 workers..... | 2,646 | 3,462 | 3,795 | 4,233 | 4,273 | 91 | 88 | 74 | 66 | 59 | 100 | 131 | 143 | 160 | 161 |
| Czechoslovakia: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 1,059 | 1,183 | 1,267 | 1,366 | 1,425 | 163 | 147 | 128 | 112 | 105 | 100 | 112 | 120 | 129 | 135 |
| Per 1,000 workers..... | 7,220 | 8,463 | 9,103 | 9,916 | 10,155 | 249 | 216 | 178 | 155 | 140 | 100 | 117 | 126 | 137 | 141 |
| German Democratic Republic: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 1,155 | 1,312 | 1,514 | 1,654 | 1,676 | 178 | 163 | 153 | 136 | 124 | 100 | 114 | 131 | 143 | 145 |
| Per 1,000 workers..... | 8,503 | 9,894 | 11,349 | 11,948 | 11,899 | 293 | 253 | 223 | 187 | 164 | 100 | 116 | 133 | 141 | 140 |
| Hungary: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 520 | 572 | 637 | 711 | 722 | 80 | 71 | 64 | 58 | 53 | 100 | 110 | 123 | 137 | 139 |
| Per 1,000 workers..... | 3,398 | 3,982 | 4,259 | 4,683 | 5,043 | 117 | 102 | 84 | 73 | 69 | 100 | 117 | 125 | 138 | 148 |
| Poland: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 724 | 1,001 | 1,418 | 1,837 | 2,189 | 112 | 124 | 143 | 151 | 162 | 100 | 138 | 196 | 254 | 302 |
| Per 1,000 workers..... | 2,799 | 4,160 | 6,205 | 6,938 | 8,341 | 97 | 106 | 122 | 108 | 115 | 100 | 149 | 222 | 248 | 298 |
| Romania: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 496 | 571 | 634 | 828 | 904 | 76 | 71 | 64 | 68 | 67 | 100 | 115 | 128 | 167 | 182 |
| Per 1,000 workers..... | 1,854 | 2,448 | 3,083 | 3,910 | 4,450 | 64 | 62 | 60 | 61 | 61 | 100 | 132 | 166 | 211 | 240 |
| Yugoslavia: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 397 | 592 | 763 | 1,021 | 1,165 | 61 | 73 | 77 | 84 | 86 | 100 | 149 | 192 | 257 | 293 |
| Per 1,000 workers..... | 1,587 | 2,489 | 3,409 | 6,584 | 7,717 | 55 | 64 | 67 | 103 | 106 | 100 | 157 | 215 | 415 | 486 |
| Total, Eastern Europe: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 649 | 807 | 992 | 1,220 | 1,352 | 100 | 100 | 100 | 100 | 100 | 100 | 124 | 153 | 188 | 208 |
| Per 1,000 workers..... | 2,900 | 3,917 | 5,100 | 6,396 | 7,260 | 100 | 100 | 100 | 100 | 100 | 100 | 135 | 176 | 221 | 250 |
| Western Europe: | | | | | | | | | | | | | | | |
| Per 1,000 hectares..... | 1,357 | 1,601 | 1,885 | 2,051 | 2,256 | 209 | 198 | 190 | 168 | 167 | 100 | 118 | 139 | 151 | 166 |
| Per 1,000 workers..... | 11,740 | 15,017 | 19,400 | 22,213 | 25,545 | 405 | 383 | 380 | 347 | 352 | 100 | 128 | 165 | 189 | 218 |

Sources: For Eastern Europe: Calculated from statistical yearbooks of respective countries; For Western Europe: FAD yearbooks and FAD monthly statistical bulletins.

Most of the East European countries made rapid progress toward increased use of fertilizers in recent years. Table 9 shows that by 1983-87, consumption of fertilizers per unit of land was exceeding the West European level in Czechoslovakia and the GDR. Hungarian, Bulgarian, and Polish consumption per hectare were getting closer to the level of Western Europe. The heavily increased application of fertilizers already is reflected in significantly increased yields in Eastern Europe, but the rationality of the increased use is not immediately evident. A calculation would require a "good" set of relative prices of production factors, other inputs, and agricultural products.

TABLE 9.—CONSUMPTION OF COMMERCIAL FERTILIZERS PER HECTARE OF AGRICULTURAL LAND

| | Pure substance ¹ in kilograms per hectare | | | | | Eastern Europe = 100 | | | | |
|---------------------------------|--|---------|---------|---------|----------------------|----------------------|---------|---------|---------|----------------------|
| | 1973-75 | 1976-78 | 1979-82 | 1983-85 | 1986-87 ² | 1973-75 | 1976-78 | 1979-82 | 1983-85 | 1986-87 ² |
| Bulgaria..... | 105 | 119 | 151 | 152 | 130 | 75 | 78 | 96 | 98 | 83 |
| Czechoslovakia..... | 218 | 244 | 248 | 260 | 242 | 156 | 161 | 158 | 168 | 155 |
| German Democratic Republic..... | 287 | 273 | 270 | 250 | 265 | 205 | 180 | 172 | 161 | 170 |
| Hungary..... | 201 | 221 | 225 | 226 | 212 | 144 | 145 | 143 | 146 | 136 |
| Poland..... | 176 | 189 | 186 | 176 | 187 | 126 | 124 | 118 | 114 | 120 |
| Romania..... | 69 | 87 | 91 | 90 | 97 | 49 | 57 | 58 | 58 | 62 |
| Yugoslavia..... | 49 | 57 | 65 | 68 | 75 | 35 | 38 | 41 | 44 | 48 |
| Eastern Europe..... | 140 | 152 | 157 | 155 | 156 | 100 | 100 | 100 | 100 | 100 |
| Western Europe..... | 176 | 197 | 210 | 229 | 240 | 126 | 130 | 134 | 148 | 154 |

¹ Nitrogen (N), phosphate (P₂O₅), and potash (K₂O).

² Data for 1987 are preliminary.

Sources: Eastern Europe: Calculated from statistical yearbooks of respective countries; Western Europe: FAO yearbooks and FAO monthly statistical bulletins.

The adoption of high-yielding crop varieties and livestock breeds helped to increase yields per unit of input in all the East European countries. Research on improvement of seeds has been stepped up by the agricultural research institutes, partly under the coordination of the CMEA (Council for Mutual Economic Aid) Permanent Commission on Agriculture. New breeds of livestock are being imported from Western Europe and the U.S.A., especially by Hungary. The recent development in Eastern Europe of agro-industrial complexes is increasing the overall efficiency of labor use through local processing of agricultural products, employing seasonally idle agricultural labor, and diffusing technical knowledge in rural areas.¹⁰

VIII. COMBINED FACTOR PRODUCTIVITY

Knowing output, labor input, and estimated nonlabor input indexes, we calculated the combined factor productivity in agriculture using a Cobb-Douglas production function.¹¹ Table 10 presents for 1965-86 the combined factor productivity for six East European countries individually and for the whole of Eastern Europe, excluding Romania (for which reliable data were not available).

TABLE 10.—COMBINED FACTOR PRODUCTIVITY, 1965-86

[Indexes of 3-year moving averages, 1965-67 = 100]

| Year | Bulgaria | Czechoslovakia | German Democratic Republic | Hungary | Poland | Romania | Yugoslavia | Totals | |
|--------------|----------|----------------|----------------------------|---------|--------|---------|------------|----------------------------------|-------------------------------------|
| | | | | | | | | Weighted total for six countries | Unweighted average of six countries |
| 1965-67..... | 100 | 100 | 100 | 100 | 100 | NA | 100 | 100 | 100 |
| 1967..... | 101 | 104 | 103 | 103 | 102 | NA | 104 | 103 | 103 |
| 1968..... | 100 | 105 | 104 | 106 | 98 | NA | 107 | 102 | 103 |
| 1969..... | 100 | 106 | 102 | 103 | 94 | NA | 106 | 100 | 102 |
| 1970..... | 102 | 105 | 100 | 104 | 92 | NA | 109 | 99 | 102 |
| 1971..... | 105 | 106 | 101 | 103 | 95 | NA | 109 | 101 | 103 |
| 1972..... | 107 | 108 | 103 | 108 | 98 | NA | 114 | 104 | 106 |
| 1973..... | 107 | 111 | 107 | 111 | 99 | NA | 119 | 106 | 109 |
| 1974..... | 110 | 112 | 108 | 113 | 98 | NA | 123 | 108 | 111 |
| 1975..... | 113 | 111 | 108 | 111 | 95 | NA | 127 | 107 | 111 |
| 1976..... | 114 | 113 | 107 | 111 | 93 | NA | 132 | 107 | 112 |
| 1977..... | 114 | 113 | 105 | 111 | 94 | NA | 137 | 107 | 113 |
| 1978..... | 114 | 113 | 106 | 113 | 93 | NA | 141 | 108 | 114 |
| 1979..... | 114 | 112 | 106 | 112 | 91 | NA | 145 | 107 | 114 |
| 1980..... | 114 | 110 | 107 | 111 | 85 | NA | 151 | 106 | 113 |
| 1981..... | 114 | 110 | 105 | 114 | 82 | NA | 158 | 106 | 114 |
| 1982..... | 115 | 109 | 104 | 114 | 82 | NA | 165 | 106 | 115 |
| 1983..... | 117 | 110 | 105 | 117 | 84 | NA | 171 | 109 | 118 |
| 1984..... | 113 | 110 | 107 | 115 | 86 | NA | 172 | 109 | 118 |
| 1985..... | 116 | 109 | 109 | 116 | 90 | NA | 177 | 112 | 120 |
| 1986..... | 115 | 108 | 109 | 115 | 89 | NA | 177 | 111 | 119 |

Sources: Combined factor productivity was calculated by a Cobb-Douglas production function of the form $Output = A \cdot L^{\alpha} \cdot K^{(1-\alpha)}$, where L represents the labor input index, K the nonlabor (capital, land, and expenses) input index, α the percentage share of returns to labor in total output, $(1-\alpha)$ the share distributed to nonlabor factors of production valued at adjusted factor cost, and A the combined factor productivity. For output, labor input, and operating expense indexes, see OP-62 and OP-101; for agricultural land and fixed capital indexes, see statistical yearbooks of respective countries. The percentage shares of labor and nonlabor inputs in total output in the 1967-69 period (depending on the country) were estimated from OP-48 and OP-62; these shares were used to calculate factor productivity for the 1965-75 period. The percentage shares of labor and nonlabor inputs in total output in the 1975-77 period (depending on the country) were estimated from OP-64 and OP-101; these shares were used to calculate factor productivity for the 1975-86 period. These two indexes were linked at 1975 to obtain one consistent series. Eastern Europe: The weighted average of 6 countries was calculated from 1975 based indexes using as weights the 1975 agricultural output for the respective countries valued in 1978 U.S. dollars.

¹⁰ See *Zemledska ekonomika*, 1987, No. 5, pp. 345-353.

¹¹ See the notes to Table 10.

The results show that from 1965 to 1975 in all countries, except Poland, combined factor productivity was increasing at a rate of about 1 percent or more annually, on the average; in Poland it decreased slightly; in Eastern Europe as a whole, combined factor productivity, taken as an unweighted average, increased 11 percent but only 7 percent in terms of a weighted average. This somewhat favorable progress could be explained by the positive effects of several nonmeasurable factors, such as improved technology, more efficient organization of production and better allocation of inputs, and above all, improved personal incentives to farmers via improved prices, incomes, and decentralization of decisionmaking.

From 1975 to 1982, factor productivity decreased by about 1 percent for the region as a whole as measured by the weighted total. In the last 4 years, however, it resumed its slow growth. Yugoslavia is the only country where factor productivity was increasing rapidly during the whole period under study. The main reasons for lagging factor productivity in the late 1970's and early 1980's were a slowdown in the application of new technology on farms, a sharp decrease in imports of feed and other inputs due to hard currency foreign exchange shortages, increases in the cost of fuel and other inputs, and a certain degree of recentralization in management and a consequent decrease in personal incentives to farmers. Last but not least, the adverse weather conditions in most East European countries during those years also contributed negatively to factor productivity. In the last 4 years, renewed incentives to farmers, discussed earlier, seem to have again a positive effect on factor productivity.

IX. TERMS OF TRADE FOR AGRICULTURE AND IMPLICATIONS FOR REFORM

In this section we present the terms of trade (price parity ratio) for Bulgarian, Czechoslovak, Hungarian, Polish, Romanian, and Yugoslav agricultures in their transactions with all nonagricultural sectors for the 1970-86 period. Table 11 shows the indexes of terms of trade, calculated as the quotients of the indexes of average prices received for agricultural products divided by the indexes of average prices paid for production inputs into agriculture. For Poland, in addition to terms of trade for agriculture as a whole, indexes are given separately for individual farming and socialized farming.

TABLE 11.—TERMS OF TRADE FOR AGRICULTURE, 1970-86

(Indexes: 1970 = 100)

| Year | Bulgaria | Czechoslovakia | Hungary | Poland | | | Romania | Yugoslavia |
|-----------|----------|----------------|---------|---------|------------|-------|---------|------------|
| | | | | Private | Socialized | Total | | |
| 1970..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1971..... | 103.9 | 99.1 | 101.7 | 105.8 | 97.8 | 105.5 | 94.3 | 110.0 |
| 1972..... | 103.2 | 100.3 | 101.3 | 109.2 | 141.8 | 130.1 | 96.7 | 124.0 |
| 1973..... | 103.3 | 102.0 | 104.4 | 109.7 | 151.0 | 123.9 | 96.9 | 138.0 |

TABLE 11.—TERMS OF TRADE FOR AGRICULTURE, 1970–86—Continued

[Indexes: 1970 = 100]

| Year | Bulgaria | Czechoslovakia | Hungary | Poland | | | Romania | Yugoslavia |
|-----------|----------|----------------|---------|---------|------------|-------|---------|------------|
| | | | | Private | Socialized | Total | | |
| 1974..... | 106.6 | 101.7 | 104.2 | 114.4 | 173.4 | 131.5 | 98.8 | 107.0 |
| 1975..... | 108.4 | 100.5 | 101.9 | 116.9 | 156.1 | 134.2 | 115.9 | 93.0 |
| 1976..... | 102.0 | 97.8 | 120.5 | 165.7 | 138.7 | 116.4 | 98.0 | ..... |
| 1977..... | 108.1 | 99.5 | 98.2 | 118.0 | 164.6 | 136.0 | 107.4 | 105.0 |
| 1978..... | 110.7 | 99.9 | 98.0 | 120.8 | 165.7 | 138.4 | 106.9 | 110.0 |
| 1979..... | 112.6 | 98.6 | 96.0 | 122.4 | 170.1 | 140.9 | 107.4 | 127.0 |
| 1980..... | 117.8 | 100.1 | 87.0 | 132.3 | 173.8 | 143.6 | 112.4 | 151.0 |
| 1981..... | 125.3 | 99.7 | 86.7 | 164.2 | 207.4 | 175.0 | 113.0 | 174.0 |
| 1982..... | 125.7 | 97.9 | 82.9 | 121.3 | 180.1 | 133.5 | 120.2 | 182.0 |
| 1983..... | 121.6 | 97.6 | 81.7 | 118.1 | 181.3 | 130.7 | 113.7 | 191.0 |
| 1984..... | 124.8 | 95.8 | 80.3 | 120.3 | 188.7 | 133.3 | 115.0 | 167.0 |
| 1985..... | 115.8 | 95.6 | 79.4 | 121.4 | 187.4 | 134.3 | 117.0 | 161.0 |
| 1986..... | 113.3 | 95.4 | 80.7 | 118.3 | 180.4 | 130.8 | 115.3 | 169.0 |

Sources: Calculated from price data taken from statistical yearbooks of respective countries. For each country, the index of terms of trade for agriculture (price parity ratio) was obtained by dividing the index of prices received for agricultural products by the index of prices paid for production inputs into agriculture. For details, see OP-101, Tables 13-17.

The findings in Table 11 show an improvement of terms of trade for all six countries in the first half of the 1970's. Between 1975 and 1986, the Czechoslovak and Hungarian terms of trade for agriculture deteriorated by about 5 and 20 percent, respectively. Hungarian agriculture, being more exposed to declining world farm market prices, was especially hard hit. The Polish terms of trade, however, continued to improve for both private and socialized farming almost year by year through 1981. The rate of improvement for socialized farming was significantly higher than for private farming. This differential rate of improvement is due primarily to a much faster increase in the prices paid for inputs by private farming than in the prices paid by socialized farming. In 1982-83 the terms of trade in Poland declined greatly for private farming and to a lesser degree for socialized farming. Data for 1984-85 show some improvement in terms of trade.

Bulgarian, Romanian, and Yugoslav terms of trade for agriculture experienced dramatic changes during the period under study. First, the index of terms of trade improved 26, 20, and 91 percent, respectively between 1970 and 1982 (1983 for Yugoslavia), then declined in all three countries from 1982 to 1986. In order to improve performance, the current and future agriculture reforms in Eastern Europe will have to restructure the pricing mechanism in the direction of eliminating huge subsidies and toward improving the terms of trade of farmers.

X. SIZE COMPARISONS OF OUTPUT BETWEEN EASTERN EUROPE, U.S.S.R., AND U.S.A.

In Table 12 we summarize our findings as to the comparative size of agricultural output in Eastern Europe, the U.S.S.R., the U.S.A., and individual countries for selected periods in terms of international dollars (totals and per capita). International comparisons of output per capita provide better measures of relative self-sufficiency than comparisons of total agricultural output. We may define "self-sufficiency" to be 86 percent of the U.S. level of per

capita output as the norm of an adequate food supply.¹² The per capita levels of agricultural output in terms of U.S.A. = 100 indicate the U.S.S.R. produced roughly 77 percent and Eastern Europe 78 percent of the output of the United States in the 1979-81 period; this was clearly inadequate if we consider 86 percent of the U.S. level to be the norm for an industrial society. However, per capita levels of output in Eastern Europe and the Soviet Union improved toward self-sufficiency in the 1982-87 period.

TABLE 12.—COMPARISONS OF LEVELS OF AGRICULTURAL OUTPUT AND AGRICULTURAL OUTPUT PER CAPITA: EAST EUROPEAN COUNTRIES, U.S.S.R., AND U.S.A.

[In percent, U.S.A.-100]

| | Total agricultural output | | | | | | | |
|----------------------|---------------------------|---------|---------|---------|---------|---------|---------|---------|
| | 1976-78 | 1979-81 | 1982-84 | 1985-84 | 1976-78 | 1979-81 | 1982-84 | 1985-87 |
| Bulgaria | 3.3 | 3.3 | 3.6 | 3.3 | 82.5 | 85.7 | 93.8 | 88.4 |
| Czechoslovakia | 4.8 | 4.7 | 5.2 | 5.3 | 70.3 | 70.5 | 78.6 | 81.6 |
| GDR | 6.2 | 6.1 | 6.3 | 6.6 | 81.3 | 83.5 | 88.0 | 95.9 |
| Hungary | 4.8 | 4.8 | 5.5 | 5.1 | 99.8 | 103.1 | 119.3 | 114.9 |
| Poland | 14.2 | 12.9 | 12.8 | 13.2 | 90.3 | 82.3 | 81.9 | 84.8 |
| Romania | 7.6 | 7.2 | 7.7 | 8.4 | 77.0 | 73.7 | 80.5 | 88.3 |
| Yugoslavia | 6.1 | 5.9 | 6.5 | 6.2 | 61.4 | 60.3 | 67.1 | 63.9 |
| Eastern Europe | 46.8 | 45.0 | 47.5 | 47.9 | 79.7 | 77.8 | 83.5 | 85.5 |
| U.S.S.R. | 85.8 | 77.2 | 84.6 | 87.4 | 85.1 | 77.2 | 85.0 | 87.7 |
| United States | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Sources: Physical quantities and population data were taken from statistical yearbooks of the respective countries. For calculating comparative levels, country indexes of agricultural output were valued with international dollar weights for the 1979-81 period; see United Nations, Food and Agriculture Organization, Production Yearbook, 1986, Rome, 1987, pp. 5 and ff., and FAO, Monthly Bulletin of Statistics, No. 11, 1987, pp. 13-16.

Among the individual countries in the 1985-87 period, the highest per capita level was in Hungary (115 percent of the U.S. level), followed by the GDR (96 percent). Bulgaria, Poland, and Romania provided adequate food domestically, while Czechoslovakia and Yugoslavia were deficient in domestic output if they were to maintain roughly the U.S. level of per capita consumption. Eastern Europe's efforts to achieve self-sufficiency in food consumption are showing substantial progress. A full consideration of "output" as a measure of self-sufficiency would have to take into account each country's net reliance on foreign trade as regards inputs into agricultural production. Foreign trade in fertilizers, pesticides, feed-stuffs, etc., would enter the calculus.

XI. 1988 PRELIMINARY RESULTS

Final reports on 1988 harvests in Eastern Europe are tentative. Preliminary figures indicate mixed results in comparison to 1987, which was just barely an average year. In Czechoslovakia, a modest 1.9 percent increase was achieved. Compared to 1987, the yield of winter wheat is 8 to 12 percent higher, that of barley 20 to 30 percent lower, and that of rye about the same. For the first 7 months of 1988, state procurement of livestock increased 2.3 percent, that of milk decreased 1.1 percent, and that of eggs rose 0.3 percent.¹³

¹² For the 1976-82 period, in the U.S.A. 86 percent of agricultural output was consumed domestically and the net balance was exported. (See U.S. Department of Agriculture, *Agricultural Statistics 1982*, pp. 430, 525.)

¹³ *Hospodarske noviny*, No. 34, Aug. 26, 1988, *Rude pravo*, Sept. 7, 1988, and *ibid.*, Jan. 26, 1989.

In the GDR, output decreased 2.7 percent. The state plan for the grain harvest was fulfilled; however, state procurement of animal products remained roughly unchanged and livestock herds decreased in the first 6 months of the year. Production on private farms and private plots increased between 3 and 7 percent in the first 6 months.¹⁴ In Hungary, output rose 4.5 percent. The wheat, oats, and barley harvest are expected to be better than in any recent year. However, the late summer drought caused significant damage to fruits, corn, potatoes, and sugar beets, resulting in losses exceeding 20 percent in some areas. For other vegetables it was a very good year.¹⁵ The Polish grain harvest was higher than in 1987, but of a very good quality. The yield of milk per cow was higher, but the reduced number of cows resulted in lower milk production. The herds of cattle decreased by 1.7 million heads, while the number of pigs increased to the highest level since 1982. The total output rose 2.6 percent.¹⁶ For Romania, President Ceausescu announced that the grain harvest was somewhat better than in 1987. However, because of drought in July and August, corn, sugar beet, and potato production will be affected adversely. The total output rose 2.9 percent.¹⁷ Yugoslavia announced a record procurement of 3.8 million tons of wheat in 1988, of which about 1 million tons will be available for export.¹⁸ However, for the second consecutive year the drought reduced the production of corn, soybeans, and sunflower seeds, which now have to be imported in large quantities. Under normal weather conditions Yugoslavia is a major supplier of corn in Eastern Europe. The total output rose 0.4 percent.¹⁹ In Bulgaria, continuing drought in the summer had negative effect on production of corn, other grains, and sugar beets which prompted the government to buy corn from the U.S.A. The total output rose 0.6 percent.²⁰ On the basis of the above cited preliminary reports on the progress of harvesting in individual countries, 1988 agricultural production in Eastern Europe was about 1.2 percent higher than in 1987, which was barely an average year.

XII. CONCLUSIONS AND OUTLOOK FOR THE 1990's

Agricultural performance over the last decade has been uneven among the East European countries, and within particular countries. This has taken place in the context of varying systems of management. In Poland and Yugoslavia, the ownership and management of farms continues overwhelming in private hands. In Hungary, the "New Economic Policy," put into effect initially in agriculture after the 1961-62 collectivization, has provided a series of reforms with incentives to collective and individual farmers, and to a significant degree there has also been a continuous decentralization of management of collective farms. Bulgaria, Czechoslovakia, the GDR, and Romania still generally operate under tightly

¹⁴ *Neues Deutschland*, July 15, 1988, and *ibid.*, Jan. 19, 1989.

¹⁵ *Magyar hirlap*, Feb. 4, 1989.

¹⁶ *Zycie gospodarcze*, Aug. 14, 1988, and *Rzeczpospolita*, Jan. 27, 1989.

¹⁷ *Élore*, Aug. 19, 1988, and *ibid.*, Feb. 5, 1989.

¹⁸ *Politika*, No. 36, Sept. 3, 1988.

¹⁹ U.S. Department of Agriculture, FAS, *World Production and Trade*, WR36-88, Sept. 8, 1988, p. 1. FOA, Jan. 23, 1989.

²⁰ *Ibid.*, and *Ekonomicheski život*, No. 35, Aug. 31, 1988, *Rabotnicesko delo*, Feb. 23, 1989.

centralized economic systems; only a small part of agriculture is private.

With the recent trend toward rational use of resources in Eastern Europe, national leaders may want to ponder the influence of systems of management on productivity. Concerns with agricultural efficiency has prompted improvements in motivation through higher producer prices, higher profit, more freedom of action, increased producer's control of resources, and other personal incentives. To emulate the Hungarian success in agriculture, governments in other East European countries have lately indicated more favorable policies toward private farmers and owners of private plots. Gorbachev's policies of Perestrojka in the U.S.S.R. may encourage the countries of Eastern Europe to provide incentives to increase output and productivity. If such policies were put firmly in place and continued into the future, Eastern Europe could achieve the much desired self-sufficiency in agricultural production in the 1990's. Self-sufficiency could be achieved at the rational level, meaning that exports by some countries of livestock products, fruits, wine, and vegetables would pay for imports by others of high-protein feed, tropical products, tobacco, cotton, and processed specialty foods. It remains to be seen whether the East European countries will meet the challenges for improved agricultural performance.

APPENDIX A. BIBLIOGRAPHICAL SOURCES

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- Poland. Glowny urzad statystyczny. *Rocznik statystyczny*. Annual.
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Other Sources: Quantity series and national prices needed for the construction of Tables 1-12 were taken from publications of the Research Project on National Income in East Central Europe, published in New York by Columbia University and LW International Financial Research (LWIFR), 633 West 115th Street, New York, NY 10025, as follows: *Bulgaria:* G. Lazarcik, "Bulgarian Agricultural Production, Output, Expenses, Gross and Net Product, and Productivity at 1968 Prices, 1939, and 1948-1970," OP-39, 1973 (updated to 1987); LWIFR. *Czechoslovakia:* G. Lazarcik, "Production and Productivity in Czechoslovak Agriculture, 1934-38 and 1946-1967," Ph.D. dissertation (updated to 1987); Columbia University. *East Germany:* G. Lazarcik, "East German Agricultural Production, Expenses, Gross and Net Product, and Productivity, 1934-38 and 1950-1970," OP-36, 1972 (updated to 1987); LWIFR. *Hungary:* L. Czirjak, "Hungarian Agricultural Production and Value Added, 1934-38 and 1946-1965," OP-14, 1967 (updated to 1987); Columbia University. *Poland:* A. Korbonski and G. Lazarcik, "Polish Agricultural Production, Output, Expenses, Gross and Net Product, and Productivity, 1934-38, 1937, and 1946-1970," OP-37, 1972 (updated to 1987); LWIFR. *Romania:* G. Lazarcik and G. Pall, "Romania: Agricultural Production, Output, Expenses, Gross and Net Product, and Productivity, 1934-38 and 1948-1971," OP-38, 1973 (updated to 1987); LWIFR. *Yugoslavia:* J. Bombelles, "Yugoslav Agricultural Production and Productivity, Prewar and 1948-1967," OP-31, 1970 (updated to 1987); LWIFR. *Countries of Eastern Europe:* T. P. Alton, E. M. Bass, L. Czirjak, and G. Lazarcik, "Statistics on East European Structure and Growth," OP-48, 1975; LWIFR. T.P. Alton, E.M. Bass, G. Lazarcik, W. Znayenko, and J. T. Bombelles, "Agricultural Output, Expenses, Gross Product, Depreciation,

and Net Product in Eastern Europe, Prewar and 1965-1979," OP-62, 1980; LWIFR. T. P. Alton, E. M. Bass, G. Lazarcik, and Wassyl Znayenko, "The Structure of Gross National Product in Eastern Europe (Derivation of GNP Weights for 1975-1977)," OP-64, 1981; LWIFR. T. P. Alton, K. Badach, E. M. Bass, J. T. Bombelles, and G. Lazarcik, "Agricultural Output, Expenses and Depreciation, Gross Product, and Net Product in Eastern Europe, 1965, 1970, and 1975-1987," OP-101, 1988; LWIFR. J. T. Bombelles, "The Structure of the Gross National Product of Yugoslavia, 1976," OP-79, 1983; LWIFR. G. Lazarcik, "Comparative Growth of Agricultural Output, Inputs, and Productivity in Eastern Europe, 1965-1982," in U.S. Congress, Joint Economic Committee, *East European Economies: Slow Growth in the 1980's*, Vol. I, Washington, D.C., 1985, pp. 388-425. USA and USSR: United Nations, Food and Agriculture Organization, "Production Yearbook, 1986," Rome, 1987. FAO, "Monthly Bulletin of Statistics, No. 11, 1987; Rome, 1987.

APPENDIX B. METHODOLOGICAL NOTES

The definition of agriculture as an economic sector and the concepts and definitions of output and input measures used in this study have been set forth in detail in an earlier study of East European agriculture presented to the Joint Economic Committee of the U.S. Congress in 1970. (See Gregor Lazarcik, *Compendium 1970*, pp. 467-472). Perhaps only a very brief summary of the methodology used here may be in order for the benefit of the reader.

Forestry, fishing and hunting are not included in agriculture, as may be the case in some statistics. The coverage of our data ranges from 95 percent to almost 100 percent of agricultural output, depending on the country. Our measures of output and inputs are based on physical quantity series consisting of from 70 to over 100 individual products for each country. Since the official output and input measures sometimes differ from those used by international organizations, or are not published, an independent, uniform calculation of all important measures was made by the Research Project on National Income in East Central Europe in New York in accordance with standard international definitions. These measures are presented in this study.

Pricing system.—1978 dollars were used for aggregation of agricultural output to facilitate international comparisons of East European countries. Also the international dollar weights for the 1979-81 period used by the Food and Agriculture Organization of the United Nations for the calculation of regional agricultural production were used in Table 12.

Other measures (i.e., operating expenses, gross product, depreciation, and net product of agriculture) were derived from output (calculated in 1978 U.S. dollars) on the basis of percentage relationships of these measures for each country and each year calculated in each country's constant prices paid to or by producers for their products or production inputs. (The national price weights used were as follows: Bulgaria, 1970 leva; Czechoslovakia, 1977 crowns; East Germany, 1975 marks; Hungary, 1976 forints; Poland, 1977 zlotys; Romania, 1970 lei; and Yugoslavia, 1972 dinars.) This system of valuation takes into account the differences in relative scarcities in each country, and at the same time it permits international comparisons in terms of constant 1978 U.S. dollar prices for all countries.

Agricultural output.—In this study agricultural output is defined as end-use output from agriculture available for human consumption and industrial use, plus changes in livestock, and farm investment in kind by farmers' own efforts. The same concepts are used by the U.N. economic organs to calculate agricultural output in Western Europe. In this study the output of agriculture is calculated by subtracting from gross crop and animal production all intermediate products utilized on farms in further production. The physical quantities of output are then aggregated by 1978 U.S. dollar prices, see U.S. Department of Agriculture, *Agricultural Statistics, 1979*, Washington, DC, 1979, pp. 435-437 and 447-450.

Expenses and depreciation.—Current operating expenses are defined here as the total quantity of all goods and services bought by the agricultural sector from all nonagricultural sectors and from abroad and used up in the production of agricultural output. Depreciation is here defined and calculated as the current charge to take account of wear, tear, and obsolescence of capital goods serving agriculture. (See U.N. Economic Commission for Europe, "Agricultural Sector Accounts and Tables, A Handbook of Definitions and Methods," Geneva, 1956, p. 10, and U.N. Statistical Commission and Economic Commission for Europe, "European Handbook of Economic Accounts for Agriculture," New York, 1983.

Gross and net product.—The gross product of agriculture is the gross value added by productive activity within the agricultural sector. It is the contribution of the agricultural sector to gross national product (GNP). In this study it is obtained from agricultural output by subtracting current operating expenses. The net product of agriculture is the gross product minus depreciation. It is the contribution of the agricultural sector to the net national product (NNP) or net value added by the agricultural sector. For the year, after 1970, the expenses, gross and net product were calculated by a shortcut method, described in detail in *OP-48*, pp. 74-93, and *OP-62*, notes to Tables 1.1 to 7.1.

COMMENT

By Michael L. Boyd*

Agricultural reforms have frequently been the starting point of reform movements in the Soviet Union and Eastern Europe. As Cochrane and Lambert point out, in the 1980's, ongoing attempts to improve agricultural performance in Eastern Europe have involved several different approaches to reform. These reforms can be usefully divided into those which embrace administrative and economic decentralization, as Cochrane and Lambert point out, and this classification emphasizes some of the most important differences and lacks in the various reform programs.¹ To augment this approach, I focus on the requirements for agricultural reform of the traditional Soviet model which characterizes most East European countries. By first identifying common characteristics required of agricultural reforms in Eastern Europe, I examine the patterns of change in the most recent types of reform and assess their possible effects.

Reform of the Soviet model of agriculture involves four broad areas: (i) price determination, both for inputs and outputs and relative to industrial and other goods; (ii) methods for allocating investment resources, both between agriculture and other sectors and within agriculture; (iii) the mechanisms used to determine output levels and mix (i.e., the combination of planned, required targets and production for the market); and (iv) internal organization of production units (state, collective, or private farms). Although these policy areas can be identified and described separately, the specific approaches to agricultural reform adopted in East European countries in fact represent different combinations in type and degree of these policies. As I will argue, effective reform of agriculture in the Soviet-type economies must incorporate an internally consistent combination of choices in each of these areas. This assertion provides a basis for understanding past successes and failures and future prospects of agricultural reform in Eastern Europe.

The basic pattern of price policy is set by the goal of maintaining low-food prices to urban workers. In the basic Soviet model, low consumer food prices are matched by low producer prices and com-

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¹ The concepts administrative and economic decentralization used here and below are based on Morris Bornstein, "Economic Reform in Eastern Europe," *East European Economies Post-Helsinki*, a Compendium of Papers Submitted to the Joint Economic Committee of the Congress of the United States, 1977, pp. 102-134.

bined with relatively high industrial prices in order to tax agriculture to promote industrialization. The negative effects of this configuration of prices are one of the primary causes of supply difficulties in Eastern Europe. The standard response has been to raise producer prices and subsidize purchased inputs, while retaining low consumer food prices. These modified policies have increased supply somewhat (although rarely as much as needed), while leading to large current expenditures on agricultural subsidy. Although this highly visible subsidy makes agricultural price reform a prominent topic of discussion in Eastern Europe, as Cochrane and Lambert point out the political consequences of raising food prices makes any reform of the current system of price formation highly unlikely.

Investment allocation to agriculture in the Soviet model is consistent with price policy. The bias in favor of rapid industrialization implies relative neglect of the investment needs of agriculture. In combination with price policies described above, this has further decreases agricultural growth and exacerbated the problem of food shortages. The standard modification of the model has been to plan to devote more resources to agriculture and to promote utilization of more "advanced" technologies (e.g., mechanized production, improved yield varieties in livestock and crops and use of chemical fertilizers and irrigation). Increased availability of resources has often been directed at certain types of producers (e.g., state rather than private farms; or very large scale agro-industrial concerns), a factor related to organization policies. Although such changes in investment policy have improved agricultural performance, they are often accompanied by inefficient implementation which has led to poor project choice, costly overruns, and incomplete projects (this is especially true in Poland). It should be noted that agricultural investment was generally not worse than other sectors in these respects. However, long periods of neglect coupled with poor implementation of investment policies has meant that little has been gained from these reforms.

The problems of price determination and investment allocation and their reform are related to the mechanisms used to determine the level and mix of output, the combination of planned output and production for the market. The Soviet model presumes subordination of farm production to centrally determined plans, with independent socialized producer marketing held to a minimum and severe restrictions on private producers. Over time and across countries, variation in this basic pattern has been great. Variations range from those dictated by the numeric predominance of private producers (as in Poland and Yugoslavia) to experiments with the nature and role of collectives and state farms (as in Hungary and Bulgaria). In addition, the countries of Eastern Europe vary widely in the extent to which they permit and encourage producers access to private markets. How reforms address the issue of plan versus market is critical to the implementation of reforms in price determination and investment allocation and it is here that the distinction between administrative and economic decentralization is most clear.

The three policy areas discussed above are closely related. A major problem with agricultural prices in Eastern Europe is that

they are administratively determined to pursue goals which are often in conflict with the desire to increase productivity and output. A similar argument applies to investment policies. Both sets of policies create problems of inefficiency for agricultural producers as a direct result of the fact that these economies rely on planned, administered prices and investment allocation, which bear little relation to actual needs based on resource scarcity. Reliance on plans to guide production is based on the ideological belief in the undesirability of market determined outcomes for distribution. But this ignores the fact that the lower productivity and lost output engendered by allocative inefficiency due to planning methods may offset any improvement in distribution. The cause of inefficiency of administratively determined prices and investment allocation is the lack of any comprehensive evaluation of relative factor scarcities in formulating planned production and consumption decisions.

Thus any attempt to increase production and productivity in East European agriculture must address policy choices in each of these three areas at the same time in a mutually reinforcing fashion. Most past attempts at agricultural reform in East Europe have failed to do this and have thus failed. This is despite the fact that most of these previous reform programs have, in principle, addressed all of these areas. Although they have done so with greater and lesser degrees of completeness and coherence, the real problems have stemmed from incomplete implementation of proposed reforms. This points up the importance of evaluating implemented rather than promulgated reforms in assessing the potential for the current agricultural reforms in Eastern Europe to improve performance.

The final area of reform policy addresses the internal organization of productive units. These policies are related to choices made in the allocation of investment resources and also to the chosen mix of plan and market. In addition, because the primary goal in changing productive organization is to increase productivity, these policies are also closely tied to the determination of prices. The traditional Soviet model of agricultural organization incorporated both collective and state farms. The former are producer cooperatives, in which production and marketing decisions are collectively made by and residual income is shared among members. The latter are in essentials like industrial enterprises: managers make operational decisions and workers receive wages. Both of these types of organization have produced undesired effects which have exacerbated problems of supply. In collectives, these problems arise both from the influence of plan directives on internal decisionmaking and the distorted relative price structure within which production and income distribution decisions are made.² These same basic problems arise on state farms, but in these organizations they arise from the conflicting signals which affect managerial decisions made within the planning hierarchy.

² These are in distinction to potential problems in producer cooperatives outside centrally planned economies. In this context the literature on labor management and cooperatives is relevant, with its focus on problems of employment generation and incentive compatibility. Although these problems should in theory also apply to collectives in East European agriculture, they are in practice overshadowed by the factors noted above.

Thus, East Europeans are also seeking to reform the organizational structure of agricultural producers in order to increase productivity and improve supply. These reforms range from attempts to improve informational and directive flows by increasing the size of enterprises and linking them directly to processing industries (as in Bulgaria in the 1970's or the GDR at present) to attempts to increase individual incentives by decentralizing decisionmaking and relating rewards more directly to individual effort, both within socialized production organizations and by promoting private production (as in Hungary and, to a lesser extent, in Yugoslavia and Bulgaria in the 1980's). For changes in organizational structure to improve productivity, however, it is necessary to provide producers (whether socialized or private) with accurate information regarding the availability of supplies and the desires of consumers. Without a thoroughgoing price reform to provide this information, the prospects for improved performance from organizational reform are limited.

Successful agricultural reform in Eastern Europe will require development of a consistent set of policies directed at all four policy areas described above, coupled with effective implementation. Greater reliance on markets for price determination and for the allocation of investment resources (i.e., effective economic decentralization) could be successful if accompanied by changes in farm level organization which promote individual incentives and allow efficient choices to be made. This does not necessarily mean that private producers must be promoted (although this is certainly a possibility). The performance of self-managed farms in Yugoslavia suggests that one organizational structure compatible with socialist principles can produce the benefits of greater efficiency and productivity, but only when operating in an environment which allows it to choose technologies and outputs based on prices generally reflecting underlying scarcities.³

Cochrane's and Lambert's description of the reform process in East European agriculture makes clear how unlikely are the prospects for a major change. Only in Hungary has a strong commitment been made to formulate and implement a package of reforms that touches on all four of the areas described above. In each of the other East European countries, the degree of commitment to change varies directly with the extent to which reforms have been formulated. In Bulgaria and Yugoslavia, there appears to be a will to reform, although it is not clear whether this can produce the effective reforms of price determination and investment allocation needed for improved performance. In Poland and Czechoslovakia, the will to reform is weaker and the resulting plans for reform consequently less comprehensive and less likely to succeed. The GDR and Romania exhibit a strong political will not to reform the basic Soviet agricultural model. This collective experience of the East

³ For the data and argument supporting this assertion see Michael L. Boyd "On the Relative Efficiency of Private and Cooperative Socialist Organization: Yugoslav Agriculture," *Review of Economics and Statistics* (LXIX, 2) May 1987, pp. 205-214. The converse assertion that it is not possible to promote increased efficiency through organizational change without concurrent changes in price formation and investment allocation is argued in M.L. Boyd "The Performance of Private and Socialist Agriculture in Poland: The Effects of Policy and Organization," *Journal of Comparative Economics*, (XII, 1) March 1988, pp. 61-73.

European economies with agricultural reform makes one point clear: as long as policymakers in Eastern Europe are unwilling to give up the detailed control of production decisions associated with central planning, the chance of any reforms to improve agricultural productivity and increase production must remain in doubt.

