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DIMENSIONS OF SOVIET ECONOMIC POWER

HEARINGS

TOGETHER WITH COMPILATION OF STUDIES PREPARED FOR THE

JOINT ECONOMIC COMMITTEE,
CONGRESS OF THE UNITED STATES

EIGHTY-SEVENTH CONGRESS

SECOND SESSION

PURSUANT TO

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MONDAY, DECEMBER 10, 1962

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The joint committee met, pursuant to notice, at 2:15 p.m., in room AE–1, U.S. Capitol Building, Hon. Henry S. Reuss (acting chairman) presiding.

Present: Representatives Reuss, Boggs, Curtis, and Widnall.

Also present: Wm. Summers Johnson, executive director, and John R. Stark, clerk.

Representative REUSS. The Joint Economic Committee will come to order.

Chairman Patman unfortunately has been called away by the sudden illness of his mother, and he has asked me to take over the chair in his stead.

I would like to record to show the deep gratitude of the committee to the 24 authors of the study papers which are included in the joint committee print. All these papers have been prepared at our invitation, and we are very grateful to the authors, because they have given of their time without compensation.

So far, from the comments we have heard from experts on the dimensions of Soviet economic power, these study papers comprise the most complete and authoritative study of the Soviet economy that has yet been made, outside of the Soviet Union itself.

We would like to give a special word of appreciation to Mr. Leon Herman, senior specialist of the Legislative Reference Service of the Library of Congress. Mr. Herman conceived the format of the study and has been technical director of the project.

I would like to stress that the purpose of the study has not been to attempt to prove any preconceived conclusion, but to bring together the best information that we can from American experts on the subject of the Soviet economy.

We are very honored this afternoon that our first witness is Mr. Paul G. Hoffman, who is Managing Director of the United Nations Special Fund, a responsibility that puts him into very close contact with the developing nations of the world.

Mr. Hoffman has had a long and distinguished career at Studebaker-Packard, at the Marshall plan, where I had the honor of working with him and under him, as trustee of the Ford Foundation, chairman of the board of the Committee for Economic Development, and chairman of the Fund for the Republic.

He is the recipient of the Freedom House Award some years ago, and is the author of a number of books, including one just published on the problem of the developing nations.

With him is Mr. Philip Dean, of the United Nations office in this city.

Mr. Hoffman, we are honored to have you with us today.

You have a prepared statement, I understand.

Will you proceed in your own way?

STATEMENT OF PAUL G. HOFFMAN, MANAGING DIRECTOR OF THE UNITED NATIONS SPECIAL FUND; ACCOMPANIED BY PHILIP DEAN, UNITED NATIONS OFFICE, WASHINGTON, D.C.

Mr. HOFFMAN. Mr. Chairman, first of all I would say I am somewhat embarrassed because, as I understand the situation, this committee, at its present session, is concerned with the dimensions of Soviet economic power. And I have been advised that it would be particularly interested in my appraisal of the competitive situation of the United States vis-a-vis the Soviet Union in the underdeveloped countries and in any changes in the reactions and attitudes of the nations concerned.

Unfortunately, I cannot offer such an appraisal because, as an international civil servant, it would be inappropriate for me to comment on the economic policy of any specific country or on the competitive situation between two countries.

However, I understand that the committee would also be interested in my views on the question of using economic assistance to the less-developed countries for political purposes. Or rather, should I say the atempt to so use economic assistance.

On this question, I am able to speak freely as it concerns the motivations and import of that assistance as it affects all countries.

It is my strong view that economic aid used as an instrumentality for the attainment of short-range political goals is of dubious value for two reasons.

First, I do not believe that the acceptance of economic aid by an underdeveloped country offers the slightest assurance that it will accept the political ideology, forms, and associations of the country extending the aid. In fact, where attempts have been made to use aid as a political tool, short range, the recipient countries react with distaste and frequently have moved in the opposite direction from that desired by the donor country.

Second, attempts to use aid politically result in political rather than economic judgments on requests for economic assistance. As a consequence, hundreds of millions of dollars have been wasted on unsound projects.

May I suggest that the question of whether economic aid should be extended to a given underdeveloped country should be determined solely on the basis of whether such support is in the national interest of the donor country. If it is in that national interest, the selection of programs or projects to be supported should in turn be determined solely by the contribution the program or projects will make to the development of the recipient country.

Further, the channel through which the aid should be given—that is, bilateral or multilateral—should be selected on the basis of the channel which would deliver the most development per dollar.

There is no activity of which I have knowledge in which there is greater need for this sound, businesslike practice than economic aid programs.

Mr. Chairman, I hope that nothing I have said gives the impression that I am opposed to assistance to the less-developed countries. Quite the contrary. I believe that our national interest and the national interest of all industrially advanced countries calls for a rapid acceleration in the pace of world economic growth, particularly through increasing consumption and production in the underdeveloped world. This is true for the United States, which has the highest income per person of any country in the world. It is even more urgently true for the really poor countries. The task of expanding economic activity in those countries is of desperate urgency.

Over 100 low-income countries of this globe are, by any standard, abysmally poor. The people of these countries are in active, sometimes explosive, revolt against the conditions under which they have been living. They are determined not to accept poverty, illiteracy, chronic ill health, and despair as their way of life. They number more than 1,300 million human souls. They are involved in what has been called the revolution of rising expectations, which today could be more aptly called the revolution of rising demands. Their preoccupation is with the conquest of poverty, the preservation of identity, and the avoidance of political subservience.

There are, of course, profound moral reasons why we should be concerned with the plight of these people. I need not dwell on these. There are also compelling political reasons which justify our concern, and good commercial reasons as well.

The political reasons can be set forth by the asking of one question: How many more Cubas and Congos can we afford?

People, when unable to escape poverty they know is unnecessary, become dangerous. Their circumstances, in turn, create international hazards of the gravest import.

My acquaintance with the leaders of most of these countries, even those of the youngest countries, has convinced me that they—that is, the leaders—are seeking the course of moderation. Some are doing this in the face of tremendous pressures for drastic action. But they know that violent revolution cannot solve their basic social problems, achieve economic growth or insure political freedom. They appeal for help in eliminating the need for violent change by replacing it with more highly dynamic evolution.

Time is already very short for giving effective aid of this kind. But we must get on with the job, or be prepared to pay the much heavier cost of our failure to do so.

As for the business reasons justifying our concern with these people, in the long view the 100 underdeveloped nations are the great new economic frontier.

If the per capita incomes in these countries were to be lifted in the 1960's by only 2½ percent a year, there would be a substantial increase in exports to these countries from the industrially advanced world. Those exports, which totaled $164 billion for the 10 years 1950–60, would then reach, at a moderate estimate, $350 billion for 1960–70.

For the United States—assuming it retains as its current share of international trade—such an increase would mean by 1970 some $8.5 billion in additional exports every year.

An equivalent of more than 4.5 million jobs in the United States now depends on foreign trade. Of these, more than 1.75 million jobs depend on U.S. exports to the underdeveloped areas of the world. By 1970 this number could well increase to the equivalent of more than 2.75 million full-time jobs.

May I conclude by saying that out of my experience in administering foreign aid programs, I hold several convictions:

(1) That the most successful aid programs are those where the donor and recipient countries work together as partners with the recipient country the senior partner. External aid has a vital but limited role. It is only effective in those situations where the people of a country are determined to help themselves.

(2) That attempts to get specific credit for assistance given are certain to fail. On the other hand, aid extended effectively with the sole objective of speeding development often as a byproduct wins fast friends.

(3) That the maximum benefits from aid programs can be attained only through a coordination of all programs—those from national governments, international organizations, foundations, churches, and private individuals. This can be brought about only if the attitude of all donor groups is cooperative rather than competitive. So much assistance is needed, and the resources available are so slender, that the waste which unavoidably results from competition should be avoided.

(4) Finally, all nations should be encouraged to contribute generously. Why? Because as I have indicated, morally we cannot escape concern; politically the seething unrest demands it; economically we will gain from it. Perhaps the bluntest and most accurate answer to why we should be concerned is that we must if we are to survive.

Thank you, Mr. Chairman.

Representative REUSS. Thank you, Mr. Hoffman. Your very interesting and helpful statement raises a number of questions which Mr. Curtis, Mr. Widnall, and I may want to ask about. I note you give as your own personal observation that, for the hundred-odd underdeveloped nations, the great majority of the leaders of those nations are seeking what you call a course of moderation.

I would like to ask you if you have a judgment, from your personal observation, as to whether these developing nations are acquiring the capacity to govern themselves.

Mr. HOFFMAN. That is a rather general question.

Representative REUSS. Well, I made it general because obviously I do not want to embarrass you by asking what you think of this country or that country.

Mr. HOFFMAN. Yes, I appreciate that.

I think that in a surprising percentage of cases, these new countries have very dedicated and competent leaders. Much more so than one might expect, knowing that many of the countries really are in a very primitive stage.

Representative REUSS. I notice you made the point that external aid is only effective in those situations where the people of a country are determined to help themselves.

I take it that you make that point in conjunction with another central thesis of your presentation here this afternoon, which is that political motivations for aid are not ordinarily likely to be successful.

Mr. HOFFMAN. I make that point very vigorously, I hope.

I think that it is essential, before aid is extended, that you have the right psychological situation in the country about to receive the aid.

I know that there is quite a little thinking here and there on the part of some of the new, emerging countries that they are entitled to a great deal of external help, and I think they are inclined to overestimate what external aid (as such) can do for them.

I have found, for example, in dealing with many countries, that they are very apt to say, because, perhaps, of my old association, "What we need is a Marshall plan for Asia" or a Marshall plan for Africa, or a Marshall plan for Central America or Latin America.

At that point I state that I think the Marshall plan today is being given too much credit for the recovery of Western Europe, because in the year of the most massive American aid, which was 1949, we poured some $5 billion of American goods into the Marshall plan countries, it was a vital contribution, and they could not have achieved a recovery without it. At the same time, in that same year, the gross national product of the Marshall plan countries was $125 billion, which means our material aid was 4 percent. As far as human effort is concerned, at least 99 percent plus of the human effort that went into the recovery of Western Europe was put in by the Europeans.

Now, what we say is that there is actually nothing external aid can do for you, until you are willing to put forward a very tough effort, make genuine sacrifices, and do this under dedicated leadership—only then is external aid of value.

Don't misunderstand me.

In most of these situations, you find something very similar to the postwar conditions in Europe.

Europe could not have recovered, in my opinion, without American aid.

In much the same way these low-income countries cannot develop speedily without external aid. But the external aid has to be considered as supplementary to the effort of the people themselves.

Representative REUSS. It is sometimes said in connection with our own U.S. bilateral aid program that aid should be given to a country which does not show any great determination to help itself, for political reasons—this, in a given case, and I will not mention the name of any specific country, it sometimes is suggested that, because a ruler wants a superhighway, or jet aircraft, or some other status symbol, that this should be given in the particular case, because otherwise the country may go Communist.

What do you think of the reasoning in such a hypothetical case?

Mr. HOFFMAN. The case is not too hypothetical, for one thing.

I would say this. That I do not think I should comment on the wisdom of political bribery. What I object to is calling political bribery economic aid. They are two different things entirely.

I do not think the record shows it works very often.

Representative REUSS. Thank you.

Mr. Curtis, do you have any questions?

Representative CURTIS. It is a real pleasure to have you here, Mr. Hoffman.

Mr. HOFFMAN. Thank you.

Representative CURTIS. I am going to take this opportunity to educate myself on something that I should have looked up.

The Marshall plan originally contemplated the expenditure of how many billions of dollars—do you recall?

Mr. HOFFMAN. I happen to be able to answer that question, because I was quite involved. The estimate—and I might be a billion off on this—the first estimate came to us from the European committee, headed by Oliver Franks. It was, I think, either $26 billion or $27 billion.

Then the Harriman Committee, of which I happened to be a member, went over those figures, and we reduced the cost to $17 billion.

I think this is rather interesting, because our estimate was that with the expenditure of $17 billion of American aid the European economy could be restored, both industrially and agriculturally, to its prewar levels, the 1938 levels.

Well, I was with the program 2½ years, and at the end of 2½ years, the European economy had not only recovered, but had by that time moved ahead 40 percent in industrial output and 20 percent in agricultural output. The total cost had been at that time under $10 billion.

Now, the natural question asked is why the European economists, who were very brilliant people, and the American group, were so far off in their estimates as to the amount of aid required. And I think the answer lies in a very simple thing—that you cannot put calipers on the human spirit.

In other words, the factor that was never taken into account was what hope would do to a people.

The figures in 1946–47 were accurate figures, but they were the figures of production that resulted from a situation in which the people of Europe had gotten completely discouraged. And the minute you put hope back in, it changed it.

Representative CURTIS. We ended up actually spending——

Mr. HOFFMAN. About $12 billion.

Representative CURTIS. About $12 billion.

Mr. HOFFMAN. Yes.

Representative CURTIS. I had in my mind—and I do not know where I heard it—that we had originally contemplated around $14 or $15 billion, but that we did not actually use the full amount. Then, that is true—we were below that figure.

Mr. HOFFMAN. $17 billion was the figure.

Representative CURTIS. Yes—and ended up with $12 billion. Was this originally contemplated over a 5-year period?

Mr. HOFFMAN. Four years.

Representative CURTIS. A 4-year program.

I wanted to get that information.

Now, I have always looked upon the Marshall plan as an example of a successful program. And that is what led me to ask these questions—because near the close of your brief remarks you list the features that are necessary to have a successful program.

I have had a little difficulty trying to find other programs that have been successful. There has been enough comment upon those which have been unsuccessful and I wonder if you can give us examples of other successful ones, on a much smaller scale, of course.

Mr. HOFFMAN. Well, I think in the first place we should recognize the difference between a recovery program and a development program.

Representative CURTIS. Which we are talking about here.

Mr. HOFFMAN. Yes. In other words, a recovery program was merely creating the conditions under which skilled people could go back to work.

In the case of development, in many cases, not all—you have some countries that are very poor but where you do have people who are very advanced from the standpoint of education—but for the most part, you have the problem of really transforming societies.

In other words, these are very primitive societies, and before they can develop economically, the society has to be partially or completely transformed.

Now, you asked about successes—there are some. But there are certain basic conditions, including psychological conditions, that have to be met before a country can advance.

I have already spoken of one or two of those. But there are more.

Sometimes they go back into tribal customs that you have to get changed before you can develop.

You also have the social structure of a country. I do not think it avails to go into a country with a great deal of external aid, where the social structure of the country is such that all that aid will merely go to make a few rich people richer.

So you have got to take into account the social structure; does that need changing?

You have to take into account the political structure.

So I merely say this is a very complex process.

But there are some countries who, with a little help, are making progress. I think Mexico is getting very close to a breakthrough. A very special situation is Puerto Rico, but Puerto Rico has made remarkable strides.

I have great hopes for Colombia.

As a matter of fact, that is as far as I want to go.

But there are 20 countries out of the hundred where I think conditions are such that, if we have external aid properly applied, the internal situations are such that those countries can move from a situation where their people are living in poverty to where they are living in reasonable comfort in about 10 years.

Representative CURTIS. The reason I ask this is because, 3 or 4 years ago, during our foreign aid debate in the House, I asked the Foreign Affairs Committee members what guidelines they used to determine whether a program had been successful. And then, because there were no answers, I made a few suggestions of my own. One, of course, was to see whether there had been an increase in per capita GNP of the countries to whom we had given aid. I put these countries on a list, and admittedly the gross national product statistics are pretty much "guesstimates" in those countries—but I put in a series of statistics, and it indicated that in many instances the per capita GNP had been going down.

I do think that maybe we might get some criteria together on this score.

One of our Russian studies that we are going to go into points out that after the claims of a 5-year advancement in Russia the author could not be sure himself whether there had been any advancement, visible advancement, in housing and health and things of that nature.

I think if we could develop some criteria here, it might be beneficial.

Mr. HOFFMAN. Yes; it certainly would be.

The great difficulty, I might say, is getting reliable statistics from these less developed countries. The best you can hope for is really intelligent guesses as to what is going on.

Now, I brought together a group of economists and asked them what had developed in the way of increased income per person in the countries, these 100 countries I am speaking of, from 1950 to 1960. And their best guess was that there had been about 1 percent a year, of about a 10-percent increase in the incomes during that period of the whole group of countries.

Representative CURTIS. You say this is in the form of a study that might be available?

Mr. HOFFMAN. This is not in the form of a study. I would not dignify it in that way. But it is the best guess that could be made by economists that I have learned to have confidence in.

Now, the one thing I want to say, quickly, is that you have to be careful when you talk about dollar figures of income in the less developed countries. The figure that is used, generally, is that income per person in 1950 in these 100 countries to which I referred earlier was, on an average, about $90 per person. This does not mean what it seems to mean.

For example, in India, a rupee, which is worth about 20 cents, would do almost as much to sustain life, because it is a different pattern of life, as a dollar will do in America.

So I think we are apt to be confused somewhat by dollar figures. Percentages give a more accurate standard of comparison.

In other words, I think there was actually a 10-percent improvement in the personal incomes of, at that time, about 1,200 million people, increased by 200 million in 10 years—population explosion is, of course, one of the problems. A country with a greatly increasing population has to run hard to stand still. But I think the goal we are seeking in the U.N. development decade is a modest goal. It is a 25-percent increase in personal incomes in the decade, in the 1960's. This, I think, is attainable.

Representative CURTIS. Thank you very much.

Representative REUSS. Mr. Widnall?

Representative WIDNALL. Mr. Hoffman, I apologize for not being able to be here sooner to hear your testimony.

I can just think of a couple of questions I would like to ask.

I must admit I have not had a chance yet to read all the way through your statement.

In the past, in our oversea program, would you care to comment on whether or not the program itself has been conceived by us or by the donee country? By that—I have had the feeling, many times, our aid has been wasted because we have thought of something that was good

for some country, where the country itself was not particularly interested in it.

Mr. HOFFMAN. Well, Mr. Widnall, I would like to say that you have hit on something that I believe to be wholly true. I have said it for years. That is, that technical know-how cannot be exported; it can only be imported. And the same thing applies to all forms of aid. Unless the countries themselves are prepared to make use of it, and want it, any attempt to sell a program to these countries is bound to result in waste.

There is one point that I would like to make, and it has to do with this difference between a recovery program and a development program. And in this I may be raising some slight question as to Congress—congressional action.

In the recovery program in Western Europe we were given 4 years to do the job. That is a recovery program. A recovery program is a very simple program.

The development program has been on a year-to-year basis.

And I will say this—your problem here can be stated, I think, in a somewhat oversimplified way.

I would say that at least 90 out of the 100 countries that we are working with today, possess the physical resources to insure a decent living for the people, provided these resources are properly exploited. It is possible, I think, in a 10-year period to ascertain effectively what physical resources countries have, and also make plans to exploit them. But they can be exploited only by people. And this is where the real job comes in.

The human resources also are potentially there—potentially. The capacity to absorb training is present in people everywhere. That has been proven so often that it should not be a matter of any argument.

But this is not a 10-year job; this is a 40-year job—at least 40 years before we can say that the people of these countries are educated to a point where they can make effective use of the resources that are present.

This, to me, is an illuminating statistic. It was developed by Dr. Harbison at Princeton.

As I said earlier, the problem in many of these societies calls almost for transforming the society. This, in its turn, calls for leadership of a high order.

I think we would all agree that for this kind of leadership, education is necessary. In other words, 12 years of schooling, as an example.

In America, 280 people out of every 1,000 have had 12 years of schooling; in some of the countries we are working in, 1 out of a thousand.

So you have the process of starting in, you might say, from the ground, working up, and giving people education.

The great task ahead lies in the educational field.

Representative WIDNALL. Well, Mr. Hoffman, do you find that some of the countries, especially some of the newly developed countries, that they are reaching too far too fast, and that they, as a sign of prestige, would like to have a nuclear generator, while they are not paying attention to the essentials which could be more beneficial to

the country in building them up, where we could be more helpful to them than by selling them a nuclear generator?

Mr. HOFFMAN. I can give you a hopeful answer to that—because when I first got interested in this problem, which was 1956, when I was a delegate from the United States to the United Nations, I found many of the delegates in the least developed countries had in mind two great projects for their countries. One was a steel mill, and the other an international airline.

This has all changed.

In the case of, I would say, 9 out of 10 of these countries, you have a pretty solid look on the part of the leaders that are emerging. The quality of leadership in these countries is really beyond what one could hope for. You find in the newest countries that usually the layer is thin, but there are very excellent leaders. And they know the score. And they know that while sooner or later they have to industrialize in order to enjoy a higher standard of living, their first problem is that of making better use of their land and water.

Another statistic that might interest you is this.

Many factors enter into this—the size of the farm and other things—that would throw off the statistics. But it is an interesting statistic and basic. And that is that the North American farmer produces in any given year 10 times as much as his Asian counterpart and 25 times as much as his African counterpart.

They recognize today the first thing to do is to feed the people well. The land is there, the water is there. What they generally need is better fertilizer, better farming methods.

We have found a great interest in the establishment of agricultural institutes, for example. These are useful. They are terribly important, because rural life has to be made more attractive in these less developed countries in order to keep the population from just drifting into the cities and urban areas and creating new slums.

Representative WIDNALL. What do you feel, then, is the greatest contribution you can make toward the stability of the government in these newly developed countries, where you have such a thin layer of leadership, and where it has to filter down and probably they are worried about their own stability, while they are trying to attack things on a major scale to bring into the country some real development?

Mr. HOFFMAN. Well, I think in many of these new countries the first step that has to be taken is really to provide them with people who can train people how to run a government. This means international civil servants. In some cases the old colonial servants are usable. But in most cases the countries want an international civil servant.

I think there is a very small Opex (provision of operational executive and administrative personnel) program, we have in the United Nations, which supplies a very real need.

Representative REUSS. What was that name?

Mr. HOFFMAN. Opex. Don't ask me what it stands for—I don't know. But it is just the Opex program.

But alongside that, you simply, as rapidly as possible, should establish institutes of public administration, so you can train people in the lower branches of government.

In other words, you have to give, I should say, high priority to institutions within the country that will make possible modern government. This is something we put a great deal of stress on, and I think, generally speaking, this is one area where the countries much prefer to have assistance come from international rather than from any national organization.

Representative WIDNALL. I have heard recently some criticism of our program in some of the Latin American countries where it seems to have concentrated on the physical, for instance, building a schoolhouse, while the Soviet people were taking the people out of the country and training them as teachers to come back and serve in the American schoolhouse.

Now, do you find any contrast in aid as between nations? Is it fair to ask you that question—since you are connected with the United Nations Special Fund?

Mr. HOFFMAN. It is fair to ask it; I would not dare answer it.

Representative WIDNALL. I am a little bit worried about that, by way of criticism of our own approach, and whether or not we are on the right track in doing that.

It seems to me that in the past our own country has emphasized too much the physical, and I think this can be blamed on those in politics, it can be blamed on those who are in industry and in labor, who want to sell American products overseas; and there has been a lot of concentration on what we can sell overseas, and a program to do this—and building a schoolhouse might involve these products, while teaching some teachers may not involve work and employment up here to any extent.

Mr. HOFFMAN. Well, I would quite agree that in too many cases too much attention has been given to physical buildings rather than to people. In other words, it is the people that are important. You can actually get along without a schoolhouse, you know, in Africa—you can teach them under a tree, if you have to. The important thing is teachers.

This might be of some interest to you.

In the Special Fund, its particular responsibility is assisting countries in finding out what physical resources they have, and then assisting in the technical training of people, technical institutes of various kinds, from college level down to just vocational schools.

When we went into Africa, we were very eager to establish certain technical institutes, because it seemed to us these technicians were very much required in order to bring about an improvement in the standard of living.

The trouble was we could not find any high school graduates to teach.

So what we had to do was take a step back, and we had to agree—we got the Governing Council of the United Nations Special Fund to agree to expand our terms, so that we could assist these countries in establishing institutes for the training of trainers of high school teachers. And we have eight of those underway now. Because you first have to have some high school graduates before you can make technicians out of them.

So the problem goes back a long way.

Now, let me say this: This is a new business. It is an extremely complicated business. And I do not think we should be too much concerned about the mistakes we have made. We have made lots of them. Everybody has made them. This is not just the United States. Everybody has made mistakes—because this business of trying to help a country speed its development, as I say, is a new business.

Looking back, I would say that our first mistake was this view that we could export our know-how.

As I said earlier, you cannot export know-how; you can only import it.

Then we thought that if we supplied technical know-how, plus money, that would do the trick. We forgot that it is literally true that the most important asset any country has is its people. We did not think enough about people.

If we had started 10 years ago and put in a very substantial part of what we had to offer in the way of assistance into training people, we would be a lot further along than we are today.

Now, the important thing is not to repeat the mistakes of the past.

I do not intend to—I should not speak for the U.S. program. But I think the U.S. program is now geared into a very substantial educational effort.

Representative WIDNALL. Thank you.

Representative REUSS. Thank you very much, Mr. Hoffman.

We appreciate your coming here, and we also appreciate your activities as an international civil servant.

Mr. HOFFMAN. Thank you for permitting me to come.

Representative REUSS. And thank you, Mr. Dean.

Mr. DEAN. Thank you, sir.

Representative REUSS. We will now hear from a panel of distinguished observers of Soviet economics. Will Mr. Eason, Mr. Thorp, and Mr. Royster please come forward.

We are very happy to have you gentlemen with us. All of you have had a particular opportunity to observe Soviet economics.

Dr. Eason, who is professor of economics at Princeton, spent the last year doing economic research in Russia.

Mr. Vermont Royster was last summer a member of a 12-man team sent on a tour of the Soviet Union by the American Society of Newspaper Editors.

Incidentally, was Harvey Chaletman, of the Milwaukee Journal, a member of that group?

Mr. ROYSTER. No, sir; he was not a member of that particular group. But I believe he made a trip with another group on his own, if I recall.

Representative REUSS. We will first hear from Dr. Eason, of Princeton University, who has a prepared statement.

Would you proceed in your own way, Dr. Eason.

STATEMENT OF DR. WARREN W. EASON, PROFESSOR OF ECONOMICS, PRINCETON UNIVERSITY

Mr. EASON. Mr. Chairman, I should like to preface my remarks this afternoon by commending highly the Joint Economic Committee for conducting yet another review of Soviet and American economic performance.

The four-volume study and hearings that were published 3 years ago have proven extremely useful to people with a wide variety of interests in Soviet affairs. And I would expect the present publication to suffer the same fate.

I hope the committee will continue to keep abreast in this way of the rapidly developing Soviet economic picture.

My own particular interest in this area concerns the problem of the utilization of human resources in Soviet economic development.

I have received only some of the papers relevant to this interest, and only last week, unfortunately, so that my remarks will have to be particularly selective and tentative.

I should like to focus on the paper on "Employment in the U.S.S.R." by Weitzman, Feshbach, and Kulchycka. But in general I will develop my remarks within a fairly broad approach to the manpower question.

I must apologize for the fact that I have not prepared my remarks in writing in advance, but this also reflects the pressure of time.

The first thing I would like to say with respect to the paper on "Employment in the U.S.S.R." is to comment very favorably on the discussion there of the problems of measurement and on the measures themselves presented. This part of the paper is extremely valuable.

The data provide us a major frame of reference for analysis, although there is need, at least for me, to know a little more about how some of the estimates were obtained. But this is a relatively minor matter.

All in all, this paper, and the one on population, reflect how much we have progressed with the help of Soviet publications since 1956 in our quantitative knowledge about Soviet manpower.

I am not going to discuss the measurement problem, even though the paper deals quite a bit with this, or the problem of the statistics themselves too much, but try to deal with the larger questions of trying to understand exactly what these statistics mean in the fullest sense of the word.

Now, if I would boil my observations down, I think they would amount to two, really.

I might say that I am going to concentrate on the questions I have about the paper, possibly even what might be called the critical remarks about the paper. But this should in no way be taken to be an overall critical evaluation of the quality of the paper, which I find very high. But I think by concentrating on the things that bother me about it, we may sharpen our knowledge about the whole question of human resources utilization in the Soviet economy.

Now, my first observation has to do with the use of words such as that there is a scarcity of labor reserves or a paucity—I think that was the word that was used—of labor reserves in the Soviet economy, or has been in recent years, at least.

I think that the impression that this discussion gives in this paper, and the use of these words in particular, while it certainly has some meaning, certainly to me, I think that the impression that the paper gives of scarcity or paucity of labor reserves is considerably exaggerated. And I will want to comment on what I mean by that in just a moment.

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The second observation that I would make is that the attempts of the paper to draw conclusions about the problems of labor input in the Soviet economy are weak, if not misleading, because they are using a relatively narrow and quantitative concept of labor input. And I will develop what I mean by that critical observation in a minute.

Let me turn first to this problem of the use of the notion that there is a scarcity or a paucity of labor in the Soviet Union.

There is quite a bit of the paper devoted to this in one way or another, and it seems to boil down to the following observation:

First—that there has been a slowdown, a temporary one, but nevertheless a significant slowdown, in the rate of growth of the able-bodied population as a result of the entry of the war babies into the work force.

Alongside this, the paper observes, focusing on the question of supplying the economy with sufficient wage and salaried workers, or workers and employees, as they are called, largely in the industrial area—the paper points out that with respect to the 7-year plan, running from 1959 to 1965, that what was originally a prospective increase of 12 million in the number of wage and salaried workers by 1965 was recently increased to 22 million as the goal to be reached by 1965.

Against the background of this slowdown in the rate of increase of the population of working ages, and effectively a doubling of the requirements in wage and salaried workers during the 7-year plan, the paper, in effect, asks where these people are coming from, saying that additional sources of labor will have to be found.

Well, my first comment on this is that the statement that they make, that additional sources of labor will have to be found, has the wrong time dimension, because as I look at the statistics, whatever has happened here has already happened. The additional sources have been found, some way or other.

I am not too sure, as I look at the statistics, something less than thoroughly, just where they got the labor from. But it is a question of the past—because the big problem that involves the relationship between the slowdown in the rate of growth of the able-bodied population, over against this 22 million increase in wage and salaried workers, has effectively had its interaction already, through the year 1961.

Let me just mention a few of the figures in order to show you what I have in mind.

Between 1959 and 1961—that is to say beginning with the yearly average number of wage and salaried workers in 1958 to the yearly average number in 1961—there has been already an increase of 11.5 million. That is essentially half of the increase that they project to 1965, in only 3 of the 7 years that go to 1965. Well, where did these come from?

Well, 1.5 million, roughly, came simply by switching the producer cooperative category into the wage and salaried category. This is pointed out in the paper. But 2.8 million came as an increase in the number of wage and salaried workers on state farms.

Now, this is an increase in wage and salaried workers, it is true. But it is an increase in the number in agriculture and, therefore, does not reflect the procurement of workers from agriculture and moving

them into nonagricultural occupations, but suggests merely a shifting in some way of agricultural workers from one category to another.

So this is also outside of the problem of meeting this 22 million increase somehow from other categories, one type or another.

And, finally, there is the fact of demobilization, which I am not too familiar—the statistics of which I am not too familiar with. But if a million or more are felt to be in this category, then something like 5 million or more of this 11 million increase in wage and salaried workers between the yearly average of 1958 and the yearly average of 1960 and 1961 has been accounted for in this way, in these special ways that do not really, except in the matter of demobilization—but that is a one-time thing—that do not really reflect a strain on other sectors of the economy to supply the increase in wage and salaried workers.

Now, this leaves to be explained, through 1961 a total of 6 million, or about 2 million per year.

Now, that is still a sizable figure to be explained.

Where do they get these people from to increase the wage and salaried workers to that point?

I cannot at the moment explain where they get these people from.

But my point is that this is a question of the past. And I think that one recommendation I would make, both to my friends who wrote the paper and also to myself, is that we have a closer look at the statistics from 1958 to 1961 to see if we can figure out exactly where they got these people from—study this thing much more closely.

In any event, by the time—and that, therefore, becomes something in the past that we ought to look at—by the time the Soviets increase their projection to 1965, from an increase of 12 million to an increase of 22 million, this period I am talking about had already been passed.

Once that was passed, once they completed 1961 and reached a total of—I forget—66 million wage and salaried workers, I think, in 1961, then the question became how to reach by 1965—how to get another 10.5 million wage and salaried workers into—how to increase that number by 10.5 million, or by 2.5 million per year in a period of 4 years, from the yearly average of 1961 to the yearly average of 1965—2.5 million per year.

Well, now I address myself to the question that was posed in the paper—where will these people come from?

Well, this is a different problem, because the situation is different.

In the first place, I wonder, since the number of state farm wage and salaried workers has been increasing by a million per year in the last 2 years, whether this will continue to increase. If it does, and something like this would be consistent with the trend to switch workers from collective farms into state farms, then, let us say, something like a million of the 2.5 million might be accounted for by a switch of categories of this type, leaving 1.5 million to be acquired elsewhere.

This 1.5 million is something to be reckoned with.

But already, as we move into 1962, we are past the period of significant slowdown in the rate of increase of the population of working ages. We are now back to the point, according to the figures reproduced in this table (p. 628 of compendium), where the population of working ages is increasing by a million or more per year.

Well, with the population of working ages increasing by a million or more per year, the possibility of acquiring this extra 1.5 million wage and salaried workers is not a problem that is terribly serious, in my view. It reflects a bit more of a strain, if all these figures make sense, than they have been faced with in the past, but it is not something to be terribly excited about.

This is, in other words, a more normal problem of distribution of manpower and recruitment of manpower, and not one of significant scarcity or paucity.

Now, to know whether these relationships that we are talking about specifically with respect to this period, involving the slowdown, the temporary slowdown in the population of working ages—whether the Soviet Union is in fact going into a period of significant strain, qualitatively, in terms of numbers, I think the period that we are just passing through is not too helpful in this respect, and that we need to know, from the Soviets, what their prospective demands will be for wage and salaried workers beyond 1965. If we knew this, then we could have a better picture of whether the projected population increases will be more or less sufficient to supply this, or whether there will be a significantly greater strain on the other sectors of the labor force to supply labor in the wage and salaried workers sector.

So what I am saying here, then, is that I think that the paper has provided us with a problem of strain in allocation which I simply do not see to that degree, in any event.

Secondly, however, under this same heading, the paper, given its need to somehow find these extra 22 million people, goes into the question of the particular sources that will be used to fulfill these needs.

They touch upon the educational reform, which they feel is a result which will really give very little in the way of extra manpower, and I tend to agree with that—that wasn't the purpose of it, in my opinion.

They touch upon private subsidiary agriculture as being a limited source for the wage and salaried workers sector. And I would agree—except again for the possibility of transfer within agriculture to wage and salaried work within agriculture, which would increase the number of wage and salaried workers but would keep these people in agriculture.

Third, they talk about the problem of getting more women into the labor force from the household. And they view this as a promising possibility for supplying labor to other sectors.

I would tend to agree with this in the short run.

I think that the problem has been given sufficient attention that in the short run women may be pushed, pulled, or otherwise encouraged to go into the labor force in numbers involving hundreds of thousands.

But in the long run I think it is another matter.

And for all of the projections that Soviet manpower specialists have made in this field—and some of them are quoted in the paper—that look toward an increase of millions, from this source, out of the households by 1980, the only thing that I can report is that when one talks to a lot of Soviet manpower specialists in the Soviet Union there is hardly what one would call a unanimity of opinion on this subject. In other words, there is not unanimity of opinion on whether, in the future, as the living standards rise, as women get more nurseries in which to put their children, and as they get more washing

machines and vacuum cleaners and things like that—whether they will decide to stay home in greater numbers or go into the work force in greater numbers.

You can get a good argument started on this any time among manpower specialists, or among the women themselves, in the Soviet Union.

And finally, the question of getting the workers from the farms into agriculture—the paper also feels that this is not overly promising.

Well, if what I have to say about the interrelationship between demand and supply is true, then it is not too much a problem—if these sources are not particularly promising—because the projected increases in the future will be met primarily out of the projected increases in the population of working ages. And the need to attract people from these other sectors, while the need is there, and the efforts have to be made, this is a problem which—and that is my main conclusion—which is a good deal less than urgent, or it does not represent something significantly different from the problem that they have faced all along.

In other words, I would say that in the past, for the last 30 years, the Soviets have been operating in an economy which is characterized by a certain amount of labor abundance. This situation is changing, it is true. It is changing under the process of economic development as the natural course of economic development. But that there has somehow developed a strain of intensive and significant dimensions suddenly, and one that they are dealing with in quantitative terms—it is this particular observation that I am not prepared to go along with.

Secondly, I would like to comment briefly on the question of manpower trends and labor policy.

Now, against this relationship that they pose between the 22 million increase and the lack of sources to supply this increase, they talk about the apparent paucity of manpower reserves on the eve of the 7-year plan, and they make the comment that the male labor pool was apparently exhausted. And they say that the inauguration of the 7-year plan carried no official elaboration of any new labor policies.

"Never has there been any public admission of labor difficulties"—is a quotation from page 628 of the compendium.

Now, I should like to ask a question as to exactly what they mean by the fact that there have not been any new labor policies or any public admission of labor difficulties.

And I simply then put that question on the table and hope that we can perhaps turn our attention to it.

The difficulty that I see here may be a limitation of the notion of what is meant by labor input—and the fact that it is limited in this paper to the quantitative dimensions.

In the quantitative dimensions alone, numbers of people and so on—one can ask what labor policies would they expect? It would have to be something, I suppose, in the direction of conscription, or their retention on jobs, or forced labor, or something like that, since the percentage of people in the labor force, as they note in the paper, are already very high.

But labor policies there have certainly been. And many of these labor policies, I think, have been a result of the recognition of this tightening up of the labor market situation.

But in order to realize the relevance of these labor policies, one has to realize that labor input has not one quantitative dimension, but essentially four dimensions.

There is the quantitative one in terms of people and hours.

There is the qualitative one in terms of skills and abilities and general attitudes toward work.

There is the third, or distributive one, having to do with the way in which labor is distributed, by area, industry, occupation, and so on.

And finally, there is the very important question of the efficiency with which labor is utilized on the job.

When we take into account these four dimensions of labor input, then certainly the period that we are talking about of the 7-year plans has had many new labor policies designed to increase labor input, when labor input is measured in terms of quality, distribution, and effective utilization on the job.

These I do not even have to review. They are familiar to all of you.

The wage reform, for instance, the reorganization of the administrative network, the educational reform itself, the increased power to trade unions, and the power to the production conferences in the factory, and so on, and the repeal of restrictions on mobility—all of these things have been designed in the end of increasing labor input, when labor input is broadly conceived, and not only in quantitative terms.

My point is that I think that one can say that in significant degree, the greater attention that the Soviets are paying to this aspect of labor input reflects the fact that they no longer have the numbers to play around with that they did before, as a substitute for quality.

Now, in conclusion, it must be realized that whatever success the Soviets have had in the past, in keeping the proportion of the population in the labor force high, in raising the level of skills, experience, and so forth, and in redistributing the labor force crudely and generally in response to the needs of the growing economy, they have been notably inefficient with respect to the utilization of manpower on the job.

It is, therefore, high time, in the interest of raising productivity in the Soviet Union, that serious steps be taken in the interests of raising the efficiency with which labor of all types is utilized on the job.

The temporary demographic squeeze on numbers has increased the pressure to move in this direction, perhaps in the nature of compensation, but it does not remove the fact that long-run imperatives of higher productivity demand attention to the problem of efficiency of labor utilization.

The problem, however, is complex and not amenable to quick solution.

One can also see weaknesses in many of the Soviet policies. They may not turn out to be effective. But whether they will succeed is a question for the future.

The question of manpower is obviously considered an important part of this study by the Joint Economic Committee. I urgently recommend that the quantitative element be analyzed in terms of the interrelationship between the quantitative and the qualitative elements, since it is the combination that determines the contribution of labor input to Soviet economic growth.

Representative Boggs. Have you concluded, sir?

Mr. Eason. Yes.

Representative Boggs. Professor Thorp, we shall hear from you, sir.

STATEMENT OF WILLARD L. THORP, DIRECTOR, MERRILL CENTER FOR ECONOMICS, AND PROFESSOR OF ECONOMICS, AMHERST COLLEGE, AMHERST, MASS.

Mr. Thorp. Mr. Chairman, as the only alumnus on this side of the table from sessions on the same subject 3 years ago, I should like to say, as someone who read the papers at that time and now the papers in this new volume, that a great service has been performed by this committee in making this material available.

It is important to have these analyses within one set of bindings, and I think not only scholars but many interested citizens will read this document.

I have regarded it as my duty, not being a Kremlinologist, to read the papers and try to point out what seemed to me the significant things that one finds therein as a general summary of what has been going on in the Soviet Union.

I have prepared a statement, and if it can be put in the record, I shall not read it in its entirety in order to provide more time for discussion.

Representative Boggs. Without objection, it is so ordered.

(The statement referred to is as follows:)

Statement by Willard L. Thorp, Director, Merrill Center for Economics, and Professor of Economics, Amherst College, Amherst, Mass.

According to the comprehensive reports of the experts who have so carefully appraised the Soviet performance for the Joint Economic Committee, heavy industry in the U.S.S.R. continues to be the star performer and agriculture to be the laggard. Defense and space expenditures mount while the consumer makes much slower progress. The diminishing availability of unused land and the slower growth of the labor force offer limited promise for further expansion, so further growth depends increasingly on added investment, more productive manpower, and possibly better organization. At the moment, management problems—both planning and operational—are sufficiently in evidence to have led to the recent announcement of the application of that universal panacea for all organizational troubles, an extensive reorganization and personnel reshuffle of the bureaucracy.

The conflict among the various claimants for priority treatment is clearly in evidence. Agriculture is a case in point. It had lagged and Khrushchev's earlier solutions were the new expanded area and the corn programs. Milk and meat were to demonstrate the Soviet's capacity to surpass American production levels. But after a brief period of agricultural improvement, the years since 1958 have shown little progress. While the year's grain crop set a new record, it was largely the result of increase in acreage rather than yield. The cotton crop was poor, potatoes very poor, and meat output was only slightly more than half the 1965 target. Less investment has been made in agriculture than was planned. The program to expand the chemical industry and thus increase the supply of fertilizer has been curtailed. To be sure, agriculture was given some aid at the expense of the consumer by increasing prices and a new program has been adopted to change the pattern of crop rotation. However, the basic fact seems to be that space, defense, and heavy industry required added funds and thus the capital needed to increase agricultural production has been limited.

It also appears that nomilitary industrial production has slowed down since 1955 and, especially, in 1960–61. According to the new index measuring civilian

industrial production, from 1950 to 1957 the rate of growth over the preceding year was in the neighborhood of 10 percent or above, except in 1952 when it was 6.7 percent. In 1958, it was 9.1 percent; 1959, 8.4 percent; 1960, 6.3 percent; 1961, 6.9 percent. The decline in the rate of increase in machinery output was even greater. From 1952 to 1957, the growth rate was 16.4 percent per year but was 8.7 percent per year in the years after 1957. Three factors are suggested as causing this slackening in the rate of growth of civilian industrial output. First is the tightening labor supply resulting from the recent reduction in the workweek from 47 to 41 hours and the slower increase in the labor force, reflecting age distribution, a slower movement from the country to the city, and the maintenance of the forces in uniform. Second is the fact that in the middle fifties military requirements did not appear to be increasing relative to the economy in general, but the new weapons systems and space projects in recent years have required the diversion of resources to those purposes. A third element is the effort to introduce greater variety in product lines. Soviet products have usually consisted of a limited number of standard models. Difficulties in creating a wider model range may help to explain the decline in the output of agricultural equipment from 1957 to 1959.

Nor has the consumer fared any better. From time to time, his importance has been recognized. In early 1961, there were signs of giving him some priority, but in the middle of the year a sharp increase in military spending, one-third above the initial plans, cut short his day in the sun. Homebuilding is lagging. Many producer goods goals were overfulfilled in 1961 while consumer goods fell behind. Descriptions of the happy days to be reached in 1980 began to be substituted for current gains. And the increases in food prices were one more evidence of the consumer's lost priority status.

Although the rate of growth of the Soviet economy continues to be high, the expert estimate is that since 1958 it probably has been below that of Germany, Italy, and Japan, and about equal to that of France, so far as such figures can be made to have any comparability. Russia's total output is about one-half that of the United States, or equal to the sum of France, West Germany, and Italy.

The recent record is disappointing to those like Mr. Khrushchev who predicted in 1959 that the superiority of the Communist system would be shown by its surpassing the United States in production in 10 to 12 years. This situation has led to considerable ferment. One answer has already been outlined by Mr. Khrushchev in a 5-hour speech in the November 1962 meeting of the Central Committee; namely, a massive economic and political reorganization. The regional economic councils, originally formed to provide some decentralization in the highly centralized planning and control structure, are to be reduced in number by about one-half, new planning agencies are to take over, and the Communist Party is to be split into branches concerned with industry and with agriculture—a spectacular tightening of party control over economic life by the watchdog committee technique. Beyond the changes in the organizational blueprint, there is talk of more basic alterations, even to the point of considering profitability as a basis for allocation.

The hope is, of course, that the reorganization will provide the magic which somehow will increase the available resources and the efficiency with which they are used. A high rate of growth makes it much easier to satisfy the various claimants, some of which have already been mentioned—the rising cost of the military, the capital needs of agriculture and industry, and the ever-present consumer. In addition, there are demands for replacement and modernization, such as diesel and electric power replacing coal, plastics replacing metal, and numerous power and irrigation projects. Foreign commitments are coming due and are a drain on resources and manpower.

There are added factors in the slackening rate of expansion. With growth, planning becomes more difficult. It is easy to expand old product lines but adding variety and complexity of product is more difficult, and delivery to industry is far easier than delivery to consumers. As equipment grows older, more repair and servicing is required. The labor force still is largely untrained, and the flow from country to city no longer shifts large numbers from agriculture to more productive industrial activity. The extension of investment to lower priority uses and locations reduces the yield. And the heavy burden of military and space expenditures makes little contribution to present consumption or future productivity.

It is important to keep in mind that in spite of all this the Soviet rate of economic growth is still high. However, recent trends may show that the game of projecting lines of growth for various economies and seeing where they cross may be even more pointless than it was. But the Soviet is growing and its problems are largely those of allocation and efficient use of resources rather than of the appearance of insuperable difficulties. As I said before this committee in 1959, "It seems only prudent to assume that the U.S.S.R. will continue her rapid growth, even though there may be a gradual decline in the rate of increase over the years."

While we are greatly interested in internal Soviet economic developments, they become of particular concern to us as they are reflected in Soviet military capability and in Soviet international relations. For many years, the Soviet objective in the international economic field was to approach as closely as possible to self-sufficiency. In the early fifties, Communist bloc trade began to rise. On the basis of the overall statistics, Soviet foreign trade appears to have taken a great leap forward of 21.6 percent in 1959 but to have increased by only 6 percent in 1960 and 1961. However, trade with Communist China was at its peak in 1959, declined in 1960, and dropped drastically in 1961. Soviet foreign trade with all countries except Communist China shows a more even development, increasing 18.6 percent in 1959, 12.6 percent in 1960, and 14.5 percent in 1961. Thus Soviet foreign trade, except for the Chinese swing, has been growing more rapidly than Soviet production or world trade generally.

Trade with the satellites has increased very rapidly since 1958. To a large degree, it consists of an exchange of Soviet fuels and raw materials for satellite machinery and equipment and finished consumer goods. This growth is clearly a reflection of an effort at economic integration of the bloc which may receive even more emphasis under the stimulus of the successes of the Common Market and its threat to Polish and East German agricultural exports. Mr. Khrushchev already has announced a meeting of COMECON soon to consider a common plan for the bloc.

About one-third of Soviet trade is with countries outside the Sino-Soviet bloc. Trade with developed countries showed little increase in 1961, but trade with less developed countries, led by Cuba, increased sharply. Soviet exports of machinery and equipment to the less developed countries doubled in 1961 over 1960, partly offsetting the reduction in deliveries of such items to Communist China. About one-fourth of Soviet machinery and equipment imports come from nonbloc countries. There is evidence that new Soviet orders for these items from the nonbloc countries have been reduced since mid-1961, but this will not be reflected in trade data until 1963.

The Soviet clearly endeavors to balance exports and imports. In 1960, total Soviet imports were only about 1 percent more than imports, while in 1961, exports were 2.5 percent above imports. Even in the cases of great change, the tendency to balance is evident. Thus trade with Cuba in 1961 consisted of Soviet imports of $312 million, mostly raw sugar, and exports of $276 million, principally machinery and equipment and crude oil. (Soviet trade data do not include military shipments.) To be sure, the balance with individual countries will reflect the extension or repayment of credit. For example, Soviet exports to China exceeded imports up to 1955, but the credits were then largely exhausted and the trade balance has been reversed ever since. With the European satellites, Soviet exports have exceeded imports since the disturbed year of 1957. With the nonbloc countries, imports have exceeded exports, particularly in the case of the less developed countries. While the details necessary for a complete balance-of-payments statement are not known, it has been estimated that net payments for foreign shipping amount to $100 million annually. It is also estimated that Soviet gold sales have contributed to its payments, having averaged about $200 million annually since 1955.

The Soviet program of assistance to the less developed countries began in 1954 and, by the end of June 1962, $5.6 billion had been extended in credits and grants to 25 countries. Economic credits accounted for $3.6 billion and military credits for about $2 billion. In addition, nearly $1 billion of foreign credits have been extended by the European satellites and $410 million by Communist China.

Five recipient countries account for more than two-thirds of all Soviet aid commitments—India, United Arab Republic, Afghanistan, Indonesia, and Cuba. Most economic assistance takes the form of a line of credit requiring subsequent planning so there is a long lag between commitment and expenditure. On the other hand, deliveries of military goods are rapid since they can be made out of stocks or current production without any need for special designs.

It is reported that no new foreign aid commitments have been entered into since the fall of 1961, possibly reflecting the uncertainty of Cuban requirements and a shift in overall priorities. However, while capital grants are not being expanded, the scale of technical assistance has more than doubled in the last 4 years. In the first half of 1962, approximately 9,000 Soviet technicians spent a month or more in the less developed countries, and a reverse tide of technicians and students came to the U.S.S.R. for study and training.

In international relations, economic and political policies are closely related. Russian political objectives seem to be clearly reflected in the behavior of its trade with China and Cuba. However, it is equally important to note that foreign trade is now a part of the economic plan. Exports are intended to finance the imports which are needed to supplement its own output. Most of Russia's foreign sales represent small additions to the world market and have been absorbed with little difficulty. However, relatively large sales of tin in 1958 upset the operation of the International Tin Agreement, and more recently, Soviet efforts to market increasing amounts of petroleum have had serious repercussions on non-Communist oil-producing countries. Neither of these instances appears to have involved a deliberate attempt to create an economic disturbance, particularly since the damage done was to suppliers in less developed countries. However, the fact that this can happen would suggest that the free world must keep international trade open and flexible so that any shocks can be readily absorbed. At the moment, however, it appears that the bloc regards trade as an important adjunct to the domestic economy and disruption of markets would not contribute to this goal. Of course, when political objectives call for some other course, it can be assumed that they will be controlling.

The apparent shifts in the nature of Soviet economic assistance would seem to suggest that the Russians have concluded that the transfer of physical resources through loans is less productive and more costly than the personal contact of expert and trainee in contributing to world conquest. Given other pressing claims on Soviet resources, foreign assistance has always been difficult for them to defend when it has involved a drain on current production rather than the transfer of outdated military equipment. Furthermore, Russian foreign aid has been beset with problems of meeting delivery schedules and expectations with respect to quality. While American foreign aid has often been subject to criticism, it stands up well when compared with Russian performance. The possibility of reduced Soviet activity in this field should not be taken as providing us with an opportunity similarly to withdraw, but rather of making even greater contributions in building the new economies of the less developed countries. In particular, we need to review the area of technical assistance with a view to strengthening its effectiveness. The Peace Corps is an important recent contribution in this field. However, who will train the future leaders of these countries and where it will be done is a major matter of longrun significance. This seems to have high priority in the Soviet program.

Mr. THORP. Perhaps I might add that when we talk about Soviet technicians abroad, it is important to realize that the figure of 9,000 is not comparable with the number of people that we send out under the heading of technical assistance. The Soviet technicians figure includes technicians who have gone out to install new plants, for example, in foreign countries.

In our case, if this were done with U.S. Government assistance, it would be done by an American contractor and the Americans that the contractor sent abroad would not be counted as part of our foreign technical assistance program.

Representative BOGGS. Thank you very much, Mr. Thorp.

Mr. Royster.

STATEMENT OF VERMONT ROYSTER, EDITOR, WALL STREET JOURNAL

Mr. ROYSTER. Mr. Chairman, if I may accept your invitation to put this statement in the record, I shall abridge it quite considerably.

Representative BOGGS. Without objection, it is so ordered.

Mr. ROYSTER. I have a very simple proposition to put on the table. It is that the Soviet Union, by the standards of any advanced Western industrial country, is an economically backward country. This is so, I believe, whether the test be industry, agriculture, technology, labor skills, or the standard of living of the people. From this, it seems to me to follow that the dimensions of Soviet economic power are not so great as they are sometimes pictured, or as we may imagine.

Insofar as the total power rests upon economic strength, I think the Soviet Union today is far weaker than the United States, or, indeed, any of the major Western countries.

Having set forth this proposition, I would like to offer some explanation for the apparent paradox this raises, most notably by the successes of the Soviet Union in space activities, in foreign aid and trade, and so forth. I think this paradox is more seeming than real.

In discussing these two points, I am not going to bore you gentlemen with a lot of statistics. In the first place, the available statistics are, I think, highly unreliable, as Professor Eason has already suggested with regard to one set of them. Also I think they can be misleading.

For example, to judge a nation's economic growth simply by measuring its steel production, even when the statistics are trustworthy, only gives one dimension of a nation's economic power. But primarily, I am going to skip the statistics, because I am in no sense an economist and I am much less qualified to deal with these things than either of the other two gentlemen here today.

My only credentials are as a journalist of some years' experience in observing the economy of my own country and of other countries, ranging from advanced countries of Europe to backward countries of southeast Asia. While I am not unfamiliar with the literature, I am essentially a reporter, and you will be able to weigh both the advantages and disadvantages of that.

In the case of the Soviet Union, my personal observations were made on an 8,000-mile trip during the past summer, as the chairman stated, along with other editors of the American Society of Newspaper Editors. Our itinerary was quite large, reaching from Leningrad in the west to the depths of central Asia. It included Uzbekistan, Georgia, the Ukraine, pretty much the greater part of the Soviet Union except for outer Siberia.

Of course, we were always shepherded, but except for military installations, we had a glimpse of every part of Soviet life—farms, factories, homes, hospitals, schools, villages, cities—and because we had our own interpreters, we were able to talk with hundreds of citizens at work, ranging all the way from Chairman Khrushchev, who talked with us for 2½ hours down to farm peasants, factory workers, and so on. This does not make me an expert on the Soviet Union.

The only thing that made this trip unique, and possibly useful to you gentlemen, was simply that it offered an opportunity for a look at the Soviet economy as a whole.

Now I returned from this journey with many impressions, several of which bear directly on this question of the dimensions of Soviet economic power.

First of all, the Soviet Union obviously is a land of immense economic potential. It is rich in physical resources, populated by very industrious people.

Second, this immense potential is not only unfulfilled, it is actively constricted by the political and economic system. So the result is that the Soviet Union today is actually less strong in itself than many other smaller countries with smaller potentials. West Germany, for example, or France, as Professor Thorp has mentioned.

Now, first, I would like to explain this "backward" word as obviously a relative term. I am referring to backward only in the sense of the advanced industrial countries of the West, not comparing it with countries of southeast Asia or Africa. I do not make this comparison merely because the standard of living in the Soviet Union is below that in the United States or below those of Western European countries. I am referring, rather, to the basic economic sinews of any country—that is, its farms and its factories. You can find somewhere, of course, in America or Europe farms just as antiquated as any in the Soviet Union. You can find over here plants with less modern equipment, just as you can find crowded housing over here or people with shabby clothes. But I think you can safely assume that when your Soviet hosts have taken you to a plant or a farm, you have seen the very best there is. And what you have seen then, it seems to me, makes our own economic troubles here in the United States look rather trivial.

The problems of Soviet agriculture are too well publicized to need any laboring here. Professor Thorp, for one, has discussed them at great length. The thing that impressed me, however, in visiting these farms, is that the difficulty is not with any deficiency in the land itself or any lack of basic skills on the part of the farmers. The difficulties, I think, lie elsewhere.

For example, we visited a very large farm in Uzbekistan. It was a well-managed farm in many respects. But this was a farm enormously overloaded with people, the characteristic of every farm we saw and just the sort of thing Professor Eason was talking about. There were no fences anywhere, for example, and flocks of sheep had to be constantly tended.

On another farm, we saw 17 people taking care of a couple thousand head of hogs, whereas in this country that number can be handled by a man and his son, even.

The distribution and marketing are equally inefficient. In modern terms, the Soviet Union is a land practically without roads. The trucking industry, as such, does not even exist. The railroad lines are very sparse, except in the west. It just is not practical to ship perishable goods in great quantity from, say, Tashkent out in Uzbekistan, into Moscow. So you have this paradoxical situation where the people in, say, Uzbekistan will eat very well while Mr. Khrushchev is tearing his hair about the food shortage in Moscow.

But it also seems to me that the problems in industry, although they have been less publicized than agriculture, are no less real. Every factory that I saw was also overloaded with people. This is because labor is the cheapest commodity in the Soviet Union, as it is in all backward countries, and the Government, of course, is wedded to a full employment policy.

The result of all this is a kind of featherbedding that makes our American union rules look rather amateurish.

In every plant I went to, I yearned for some cost accounting figures, but the naked eye is enough to tell you that these costs must be incredibly high.

In these plants, I also looked for signs of advanced technology. In none of them where I had any standard of comparison with American plants or European plants did I find any such signs. I did see a good deal of good equipment, but the newest equipment all had a perfectly familiar look.

There were, for example, some very nice looking line-casting machines in the Pravda newspaper plant. They had a Russian label on them, but they were almost exact replicas of American Linotypes.

In a modern-looking textile plant, I saw some good new Japanese looms. I also saw some Russian looms that looked exactly like the Japanese looms. There was the same copying in Russian cameras, in earth-moving equipment, in television sets, in automobiles, in wire rolling equipment, in ball-bearing grinders and in many other areas.

The output of these factories, with some few exceptions, was, in my opinion, second or third rate. This is, of course, more striking in the consumer goods area, but poor quality shows up in other places also.

The Soviets, for example, make some very fine looking buses that look just like our familiar Greyhounds, and they make very powerful looking trucks. But both the buses and the trucks were grossly underpowered, and I saw repeated evidences of poor maintenance and inadequacy of manufacture and distribution of spare parts. I could give many specific illustrations of this. The same thing is true of their famed jet aircraft, which labor so slowly off the ground as to make our big jets, our DC–8 and our 707, look like fighter planes.

There is ample evidence that industry there is plagued by "dislocations" in the output-mix, which is a fancy phrase meaning that they are having trouble getting the right thing to the right place at the right time. This is most striking in the building industry. Nowhere in the world have I ever seen so many building projects stalled, sometimes for months on end, for the want of that proverbial nail. But these dislocations are also widespread in manufacturing plants, where a great coordination job is required, and one plant manager with whom I talked was frank enough to tell me that was his No. 1 problem.

In short, I feel it safe to say that the Soviets have solved one of the great problems of the American economy. Neither in agriculture nor in industry do they have problems with surpluses or overcapacity.

Of course, I do not want to be misunderstood about this. I am not saying that their system does not work. It does. Farms grow wheat, apartments get built, automobiles come off the assembly line. The expectation that this system is going to collapse is about on a par with the Communist idea that we are going to collapse.

What I do say, though, is that this system does work very inefficiently, and that anybody familiar with, say, the farms of France or the industry of West Germany, never mind the United States, can see that the Soviet economy is many, many years behind.

Good and efficient mass production is certainly the hallmark of any really advanced industrial society, and it simply does not exist in the Soviet Union.

When you speak of economic power, you are speaking first of all of a nation's ability to supply its own needs and then to have at least enough marginal surplus to engage in considerable outside trade for what it needs outside, and to generally export for other purposes. The Soviet Union can hardly meet the first requirement, much less the second requirement.

This, of course, then raises the paradox of this outward appearance of economic power. Here I would simply like to say that it seems to me that the same system which constitutes a drag on their general program probably helps the Soviet Union to get its great appearance of power.

The Soviet Union is essentially a feudal society by any meaningful definition of that term. If a serf is a man tied to the earth or to a machine, then the Soviet worker is a serf. If the feudal relationship is one of service to an overlord, it does not seem to me that it is altered when you change the overlord from a duke to a farm cooperative or a state-owned plant. If the feudal economic system is the fixing of wages and prices by authority, the system is unchanged when you change the authority from tradition or the church to an autocratic group of planners in Moscow.

Now, this feudal system, I think, helps give the Soviet Union this outward appearance of economic power. Because as an autocracy, the Government can commandeer the best brains, the best material, the best equipment, take what money it needs and put it to a specific problem. This, of course, is what the Government does when it draws off economic resources for a space program, or when it deprives its own country of something in order to give trade or aid to another country.

I would submit that the Soviet Union does this at a tremendous cost. Some of this cost is half-hidden and immeasurable, but some of it, I insist, is quite plain to any visitor's eye, and I think the cost might be much larger if the Soviet Union did not have such enormous resources in both physical goods and manpower.

Personally, I do not think this economy can ever be made to work very well. For one thing, this feudalistic system is rather stultifying to men's energy drive. For another thing, the socialist system or feudalistic system, by concentrating everything on a special project such as the space program can, of course, make that project hum. But by definition, the central control system eliminates any true competition and any real market system. The rigid control system is incapable of adjusting itself rapidly to changing conditions, and many specific examples of this have already been presented to this committee.

But worse, with no market system to measure by, the Soviet planners have no ready means of determining what the changing economic conditions are. The result, I think, is that the whole economy of the na-

tion is constantly being wrenched out of shape, and I think it will continue to be that way unless someday, perhaps, they change the system.

But be all that future as it may, personally, I do not think there is any doubt about the situation as of today. Take any test you will—industry, agriculture, technology, labor skills, or what-have-you—and by the standards of any advanced industrial nation, the Soviet Union is economically backward.

There are many things about the Soviet Union, of course, that disturb me—the rattling of atomic bombs or the belligerency of Mr. Khrushchev. But frankly, I am less disturbed about even these things than before I took a long, hard look at the Soviet economy. Economic power is itself a dimension in the total military power of any country. Personally, I am convinced that the dimensions of the Soviet Union's economic power are not so great as they are sometimes pictured or as many of us may have imagined.

As a matter of fact, in the light of the Soviet's economic designs, I like to startle some of my friends by saying that I came back an ardent advocate of communism—for the Russians.

Representative Boggs. Thank you very much, Mr. Royster.

(The complete statement of Mr. Royster is as follows:)

REMARKS ON "THE DIMENSIONS OF SOVIET ECONOMIC POWER" BY VERMONT ROYSTER, EDITOR, THE WALL STREET JOURNAL

In response to your request for some of my personal thoughts on the dimensions of Soviet economic power, I would like to set before you a very simple proposition.

It is that the Soviet Union, by the standards of advanced Western industrial countries, is an economically backward country. This is so, I believe, whether the test be industry, agriculture, technology, labor skills, or the standard of living of the people. From this it follows that the dimensions of Soviet economic power are not so great as they are sometimes pictured, or imagined. Insofar as its total power rests upon economic strength, the Soviet Union today is far weaker than the United States or, indeed, any of the major Western nations.

Having set forth this proposition, I would then like to offer some explanations for the apparent paradox this raises about certain Soviet activities, most notably its success in space ventures and its busy activity in foreign aid, all of which give an impression of economic strength. The paradox is, I think, more seeming than real.

In discussing these two points I will not bore you with a lot of statistics. In the first place the available statistics are highly unreliable, and where they are not factually doubtful they are often contradictory or misleading. It can be misleading, for example, to judge a nation's economic growth and power merely by citing steel production even when trustworthy figures are available; at best this measures only one dimension of an economy. But in the second place I am in no sense an economist, and am thus much less qualified to deal with these intellectual puzzles than others whom the committee will hear.

My only credentials are as a journalist of some years experience observing the economy of this country and comparing it, by firsthand study, with the economies of other nations ranging from the advanced countries of Europe to the underdeveloped countries of such places as southeast Asia. While I am not unfamiliar with economic literature, I am essentially a reporter and my judgments rest primarily on comparisons made by personal observation. You will be able to weigh both the advantages and limitations of this method.

In the case of the Soviet Union, the personal observations were made during an 8,000-mile trip in the summer of 1962. On this visit I was 1 of a group of 12 editors representing the American Society of Newspaper Editors and we were the official guests of the Union of Soviet Journalists. Our itinerary reached from Leningrad in the west to the depths of central Asia. It included the Kremlin, where we had a 2½-hour interview with Chairman Khrushchev and visits with other top officials of the Government. It included also the plains of Uzbekistan, the beaches of the Black Sea, the countryside of Georgia, and the Ukraine.

Although we were, as always with travelers in this land, shepherded by our Communist hosts, we nonetheless saw more than most visitors. Except for military installations we had a glimpse of every part of Soviet life—farms, factories, homes, hospitals, schools, cities, and villages. Because we had our own interpreters we were able to talk with hundreds of Soviet citizens at work and at play, including leading editors and key officials all over the country. We talked also with many others: farm peasants, factory workers, local Communist party members, university professors, engineers, economists, young students, musicians, actors, and poets. Quite often circumstances permitted private conversations away from the watchful eyes of our official escorts.

Such a journey does not make me an expert on the Soviet Union. What made this visit unique, and therefore possibly useful to this committee, was simply that it offered an opportunity for a look at Soviet society as a whole, not with entire freedom but freer of restrictions than is ordinarily the case.

I returned from this journey with many impressions, several of which bear directly on this question of the dimensions of Soviet economic power.

First, the Soviet Union is a land of immense economic potential. Is is rich in physical resources, populated by an industrious people equal in intelligence and in innate skill to any of the Western peoples, and it has produced able and vigorous leaders with an evangelical fervor to fulfill this economic potential.

Secondly, that this immense potential is not only unfulfilled; it is actively constricted by the political and economic system. And the result is that Soviet economic power today is actually less than that of many other countries with a smaller poential; West Germany, for example, or France.

I do not make this comparison merely because the standard of living in the Soviet Union is below not only that of the United States but of these Western European countries—shabby clothes, poor and crowded housing, monotonous food, and relative poverty of what might be called the material amenities of life such as cars, telephones, washing machines, and the rest. While these things are a measure of a nation's progress, they are not necessarily a vital part of its power—as the Communists will remind any tourist who gets smug about the comforts back home. Barbarian hordes are always poorer than the people they overrun.

I am referring rather to the basic economic sinews of any country, its farms and factories. You can find somewhere in America or Europe farms as antiquated as those they show you in Russia, or plants with less modern equipment than the Soviet best, just as at home you can find crowded housing and people with shabby clothes. But I think you can safely assume that when your Soviet hosts have taken you to a farm or a ball-bearing plant they are showing you the best they have.

What you see then makes any economic troubles of the United States seem very trivial indeed.

The problems in Soviet agriculture are too well publicized to need laboring before this committee. But what a visit to the farmland shows is that this agricultural failure is not due to any deficiency in the land or to any lack of basic skills on the part of the farmers. My ignorance of the chemistry of soils is large, but you need only look to see that the arable land is fertile, and I have no reason to doubt the opinion of American farm experts that the Soviet Union could feed its population several times over.

The difficulties lie elsewhere. The farms I visited were a paradoxical mixture of truly modern efficiency and unbelievable backwardness. The largest was in Uzbekistan where in 1930 some 130 small peasant farms were collectivized into a single farm covering 295 arable hectares; in 1950 other farms were added and its size more than tripled.

This was a well-managed farm in many respects; at least the walrus-mustached farmer—who was tunicked and booted as in a novel by Tolstoi—seemed to know his business. But the farm was enormously overloaded with people, a characteristic of every farm we saw. There are no fences anywhere, for example, and every herd of cows or flock of sheep must be constantly tended. On another farm it took 17 people to care for 2,000 head of hogs, whereas in this country that number can be handled easily by a man and a boy.

Distribution and marketing are equally inefficient. In modern terms the Soviet Union is a land practically without roads; a trucking industry simply does not exist. The railroad lines are sparse except in the west, and while some of their equipment is good the trains are slow and the handling and routing is not efficient. It just isn't practical to ship perishables in any quantity from, say, Tashkent

1,500 miles westward to Moscow. The result is that while people eat well in Tashkent, Mr. Khrushchev tears his hair about the food situation in the capital.

The problems in industry have been less publicized but they are no less real. Every factory I saw—even the ones with good equipment—were also overloaded with people. This is because labor is the cheapest commodity in the Soviet Union, as it is in all backward countries, and the Government is wedded to a "full employment" policy. The result is a kind of featherbedding that makes American union rules look amateurish. In every plant I went to I yearned for some cost-accounting figures, but the naked eye is enough to tell you the costs must be incredibly high.

In every plant, too, I looked for signs of advanced technology. In none of them where I had a standard of comparison with American or European plants of the same type did I find any such signs. I did see a great deal of good equipment, although in the same plant the new and the antiquated might be mixed together. But the newest equipment all had a perfectly familiar look. There were, for example, some nice-looking linecasting machines in the Pravda printing plant with a Russian label on them; they were almost replicas of American linotypes. A modern-looking textile plant was filled with new Japanese looms and some Russian looms that looked exactly like the Japanese ones. There was the same copying in Russian cameras, earthmoving equipment, television sets, autos, wire rolling equipment, and ball-bearing grinders.

The output of these factories, with some few exceptions, was second or third rate. This is, of course, most striking in the consumer goods area, as every tourist knows who has visited the GUM department store in Moscow. But poor quality shows up in other and more important areas. The Soviets make fine-looking buses, some of them as glossy as our familiar Greyhounds, and powerful-looking trucks. Both buses and trucks are grossly underpowered, and I saw repeated evidences of poor maintenance and the inadequacy of the manufacture and distribution of spare parts. The same thing is true of their famed jet aircraft which labor so slowly off the ground as to make our big jets look like fighter planes.

There is ample evidence that industry there is plagued by "dislocations" in the output mix and in the distribution of the right thing to the right place at the right time as a result of the rigid central planning and control. This is most striking in the building industry; nowhere in the world have I ever seen so many building projects stalled (sometimes for months on end) for the want of the proverbial nail. The dislocations are also widespread in manufacturing plants where the product requires the coordination of many different parts and raw materials. One plant manager was so bold as to admit to me that this was his greatest problem.

In short, I feel it safe to say that the Soviet Union has solved one problem of the American economy. Neither in agriculture nor in industry do they have problems with surpluses or overcapacity.

I hope I will not be misunderstood in any of this. I am not saying that the Soviet system doesn't work. It does. Farms grow wheat, apartments get built, and autos come off the assembly line. The expectation of some people in this country that a Socialist system must grind to a halt is on a par with the Communist idea that capitalism must collapse.

What I do say is that this Socialist system works inefficiently and that to anyone familiar with the farms of France or the industry of West Germany—never mind the United States—the Soviet economy is many years behind. Good and efficient mass production is the hallmark of any really advanced industrial society; it is an essential support for any nation aspiring to modern military power. To speak of "economic power" is to speak first of all of a nation's ability to supply its own industrial needs and then to have at least enough marginal surplus in total output for export outside its own trading area. The Soviet Union today can hardly meet the first requirement, much less the second.

This brings us to the paradox of the outward appearance the Soviet Union gives of economic power. I suggest that the system which is such a drag on their general program itself helps the Soviets give this appearance of power.

The Soviet Union is essentially a feudal society by any meaningful definition of that term. If a serf is a man tied to the earth or to a machine, able to leave it only by death or the permission of the authorities, then the Soviet citizen is a serf. If the feudal relationship is that of service to an overlord, it is not altered by changing the overlord from a duke to a farm cooperative or a state-owned plant. If the feudal economic system is the fixing of wages and prices

by authority, the system is unchanged when the authority changes from tradition, or the church, to an autocratic group of planners in Moscow.

This feudal system helps give the Soviet Union its outward appearance of economic power. As an autocracy, the government can commandeer the very best brains, together with the best available materials and equipment, and put them under forced draft for limited purposes. This is what the government does when it draws off economic resources to develop space rockets, for example, or when it deprives its own country of something in order to give trade or aid to another country for political purposes.

Yet I submit that the Soviet Union does this at a tremendous cost, some of it half-hidden and immeasurable, some of it plain to a visitor's eye. And the cost would be greater, except for two things: One is simply the size of the Soviet Union's physical resources; in a country less-well endowed by nature things would be much worse. The other reason why the economy "works" at all lies in the talents, energy, and determination of a small minority of people who somehow make it work in spite of everything. It is just that they cannot make it work very well.

Personally, I do not think they can ever make it work very well. For one thing, this feudalistic system—or if you do not like my word "feudal," you can call it socialistic or what-you-will—is stultifying rather than stimulating to men's basic energy drives. The farmer has no other incentive than the whip to raise hogs for the state; so he puts minimal effort into this slavelike enterprise and pours his real energy into raising the food he is permitted for himself and his family. Though less easily measurable, the same forces influence the factory worker and the manager, as well as the scientist and the poet.

But there is also another grave difficulty with this socialist system. Perhaps it is true that this system, by concentrating everything on a special project such as the space program, can make it hum. But, by definition, the central-control system eliminates any true competition and any real market system. The rigid central planning is incapable of adjusting itself rapidly to changing conditions; worse, with no market system to measure by, it has no ready means of determining what the changing economic conditions are. The result is that the whole economy of the nation—its brains, its energy, and its materials—are constantly wrenched out of shape. I think it will continue to be that way unless someday, perhaps, they change the system.

Be the future as it may, I don't think there is any doubt about the situation as of today. Take any test you will—industry, agriculture, technology, labor skills or the standard of living of the people—and by the standards of advanced industrial countries the Soviet Union is economically backward.

There are many things about the Soviet Union that disturb me; the rattling of atomic bombs, for instance, or the belligerency shown by Chairman Khrushchev in our 2½-hour interview. But I am less disturbed about even these things than I was before I took a long, hard look at the Soviet economy. Economic power is itself a dimension in the total military power of any nation, and personally I am now convinced that the dimensions of the Soviet Union's economic power are not so great as they are sometime pictured or as many of us have sometime imagined.

In fact, in the light of the Soviet's aggressive designs, I like to startle my friends by saying that I came back from this journey an ardent advocate of communism—for the Russians.

Representative BOGGS. Mr. Curtis, do you have any questions?

Representative CURTIS. Yes, Mr. Chairman.

First, let me take this opportunity to join in these expressions of appreciation and commendation of the papers that have been prepared for this committee, and I might add to that, the testimony of these three witnesses.

First, to demonstrate my feelings on it, if I have not done so in the past in our hearings in 1959, I could not agree with your estimates more, Mr. Royster.

Mr. ROYSTER. Thank you.

Representative CURTIS. Now, to go into some of the details, in which I am very much interested.

Dr. Eason, one thing I was interested in is this: in Russia do they regard the labor force as we do—14 to 65 years?

Mr. EASON. Well, 12, I think, is the lower limit on the farms. But, this is covered in the paper; 16 to 59 for males and 16 to 54 for females are the hard core of the working ages. A certain percentage of the labor force is above and below these limits.

Representative CURTIS. What I am getting to relates to our own figures and the feeling that I have that as an economy matures or advances, the amount of time that must be spent in education increases. I have been very much interested in the U.S. figures on the length of time that our people spend in education, on the average. The average now is over 19 years old before going on the labor market, and our average is close to, I think, 4 years of high school, or maybe even the first year of college.

Also in this picture is retraining, which seems to have become of increasing importance in our own society, where technological advancement has been so rapid. We have given it a name—"automation." However, we have not developed—at least I have not seen that we have—statistics that relate this factor, the necessary one of education and training, to a work force that is the kind required to handle this technology. Some of the papers touch on this.

I am just wondering, in your studies on the Russian labor force, how this fits into the picture. If they are going to spend, say, 2 or 3 years more, on the average, being educated, that is going to increase the pressures on whatever labor shortage there might be.

Mr. EASON. There is a general principle that has been operating in the Soviet economy since the beginning of the industrialization drive, with respect to education. The principle has to do with the choice in training between formal education and learning on the job, whether this be simply going to work and picking it up as you go along or on-the-job training programs of one type or another. As far as specialized education is concerned, as distinct from general primary-school type of education, Soviet policy has been to lean heavily in favor of letting the people learn on the job rather than through formal education, and, in general, to tailor the expansion of the educational network rather closely to what I would call the minimum needs of the economy for formally trained people.

They have certainly recognized very clearly from the very beginning that education was necessary to train the labor force. But they have applied formal education only where they felt it was absolutely necessary and expanded it as the economy grew.

In the early years, when the economic structure was relatively simple, embodying characteristics of the lower stages of economic development, engineers' training could be correspondingly simple. They had to have engineers, but these engineers did not have to know all that American engineers now must know. Many of them could consequently learn on the job—as they in fact did, and as ours did during the earlier decades of our development. As the economy reaches higher and higher levels, formal education becomes more and more important, involving more years in school. They are still behind us on this, but they are moving up to where all skilled persons will be required to have such formal training.

Representative CURTIS. In 1959, as I remember, the estimates were that over 50 percent of the school-age population was in rural areas.

Mr. EASON. Yes.

Representative CURTIS. And that the compulsory requirement of education was only 4 years, which astounded me, because I could not quite figure out how they could really have a good educational system if they had no better way than that of screening for the talents that would then be sent on to further education.

Mr. EASON. It is true that compulsory education of 4 years was the rule until not too long ago, although many went beyond. But the compulsory level is now 8 years, and many go beyond that.

Representative CURTIS. I know they do. But that gives us an indication, because our compulsory education is up to about 11 years, I would think.

Mr. EASON. But this reflects in part the fact that our economy at its level of development demands more education from its people, than the Soviet economy at their level of development, which is certainly more than it was years ago.

Representative CURTIS. Yes, and certainly it seems to me we have to get other measuring sticks than gross national product when talking about meaningful economic growth. This does not show up very well in gross national product, and yet it is a very real thing as the economy continues to develop.

I would like to continue this same line of questioning. I am very interested in your four points on labor import and one on efficiency on the job, because I have always tried to relate such things as housing, health, diet, and so on, not just to the wealthier people, which of course is important, but economically to efficiency on the job. Health, for example, shows up in absenteeism and such things as accidents, and housing certainly is a great factor in the work and productivity.

Some of the papers indicate, and we are having a discussion now, I think for the first time I have seen it, of the relationship of these items to efficiency on the job.

Now, is it your feeling, as I understand it, that you think the Soviets now are paying attention to these from an economic standpoint or that they have in the past but are now increasing their emphasis on them?

Mr. EASON. If you look back in the literature, way back even in the 1920's, you will find a number of writers, economists and others, who were aware of what is necessary to produce an efficient labor force. The problem has always been how to implement these ideas in practice.

It takes time, as Mr. Hoffman pointed out, to turn a primitive labor force into a modern industrial labor force. The time requirmeent cannot be compressed beyond a certain point.

In the first 30 years of rapid industrialization, the Soviets have made major strides in what might be called "investment in human resources," largely through on-the-job training and through the development of a completely "industrialized" administrative framework. Until recently, however, economic resources and specialized manpower resources have not been developed and channeled into raising the efficiency with which human resources are utilized on the job—from the higher administrative jobs to ordinary workers.

This problem is now receiving much greater attention, and resources, although it is a problem that many have been well aware of for years.

Representative CURTIS. Dr. Thorp, when you were talking about the comparison of the Russian technicians abroad with our own you said we did not include what would amount to our private technicians. Do you have any idea of what our ratio is of, say, Government technicians to private? How big a factor is that? It is fairly sizable, is it not?

Mr. THORP. I have no specific idea, but I am sure if you included in this the private educational arrangements, for example, American teachers in foreign educational institutions, as well as the people that are working on construction projects, and so forth, it would be a figure much larger than those that are ordinarily described, who are those directly on Government funds.

Representative CURTIS. I guess you would have to include, then, our people who are working abroad as employees of the foreign corporations, who may not be there just for building, but who might be there for 10, 12, sometimes 20 years.

One other item on this. Does the term "Russian technician," include some of their military personnel? For instance, in Cuba, we have been running into the fact that there are a lot of so-called technicians there, which would indicate a nice way of concealing the fact that they are really military personnel. At least, there is the allegation.

Mr. THORP. I would have to check up on that. I am not sure about this particular field. But I think it is defined—where this is discussed in the report, I think, it does make clear. But I do not recall.

Representative CURTIS. The only final comment, because my time has expired, is if Russia is going to bring technicians or people from abroad to train them as technicians, it is going to place a real burden on her educational system, which in our instance it will, too. I was very interested in a recent study, I think the NEA put it out, which showed that we are going to need about 900,000 additional people in primary and secondary public education in our society in the next 6 or 7 years. I suspect there will be a similar strain if they will really move ahead in training their own people as well as taking on people from abroad.

Mr. THORP. I do not think that numbers in Russia are anything like the numbers coming to the Western countries as yet. But they are increasing rapidly and the Russians have been giving fellowships and assistance to bring people there so that they can be trained in Moscow or other intellectual centers.

This is, I think, one of the things we really do need to worry about because, if these people are prospective leaders, the kind of training that they get, the kind of thinking that they are exposed to may have an unfortunate effect.

Representative CURTIS. Of course, we have been in that for years.

Mr. THORP. Yes.

Representative BOGGS. I would like to direct one question to the panel. Any one of you may take it or all three of you.

What would be your projection for the future, asuming that these difficulties continue in the Soviet Union and with the rise of the

Common Market in Western Europe, with both the degree of economic and political unification? Would this mean that the so-called contest with the developing areas would be resolved in favor of the West, in your judgment?

Mr. THORP. Well, let me take it first. I have never had any sympathy with this idea of projecting percentages and seeing where they crossed. This is a game in which there are no rules for scoring which apply to both sides, and I just think that this form of forecasting is already shown by the recent developments to be quite uncertain.

I personally have a feeling that the Russian economy is gradually approaching more and more difficulties. It may well not be yet at the point of labor shortage. It is getting to the point of land shortage in the sense that it cannot, again, have a big boost of crop by bringing in more acreage. It has to do something about the use of the acreage.

As it moves away from a few simple standardized products, producers goods, into consumers goods or into foreign trade, it is likely to find itself faced with production problems that are much more difficult and planning problems that are much more difficult.

One does not know what will happen to the space and defense requirements. I think they have been putting considerable pressure on the Soviet Union in the last several years. It may well be that this may taper off. There may be some maximum in that area, so that it may not be an increasing burden.

I would expect the Soviet Union to continue to grow, but I would not expect it to continue to grow at such high rates in the future as would change in any period of time, such as a decade, the general relationships of economic power as has been predicted by some people.

Representative BOGGS. Would you care to discuss the question, Mr. Royster?

Mr. ROYSTER. I agree with Dr. Thorp's general analysis of the troubles inside the Soviet Union. I am rather inclined to the opinion, without any statistical basis for it, that their space program is now putting a tremendous strain on their economy. I think it is one of the basic difficulties that they have. I do not think they are able to absorb it nearly as well as the United States is able to absorb its space program. Projecting, prophecy, is not my business. But I would not only agree with Dr. Thorp, but I might push it a little further. When you come from the Soviet Union back into Western Europe, as I did, and spend then a few weeks in Western Europe, in Germany and in France, and even today in Italy, you have the feeling that this Western European area, partly due to the Common Market, partly due to other things, is approaching a rather major explosion point, rapid economic advancements. You do not feel this at all in the Soviet Union. You feel that it is slowing down, as both these other two gentlemen have pointed out.

Consequently, I have the feeling, without projecting any percentage figures, that if the Common market goes forward as it has been thus far, and unless the Soviet Union makes a radical change in its political and economic system, that the discrepancy between Western Europe and the Soviet Union will increase rather than decrease.

Representative BOGGS. Would this act as sort of a magnet to the Soviet satellites, this discrepancy?

Mr. ROYSTER. Very much so. That is one of the primary reasons for the wall in Berlin, one of the primary reasons for the fact that the Soviet Union has to, in effect, put a wall completely around itself. I think this is one of the reasons why Mr. Khrushchev is so obviously concerned about the Common Market. I think the intelligent people in the Soviet Union, of which there are a great many, are themselves aware of this possibility.

Representative BOGGS. Dr. Eason, would you care to don the role of a prophet?

Mr. EASON. I would make two comments: One is that certainly, anything which strengthens the advanced industrial capitalist countries of the Western World makes the problem of the Soviets achieving their goals more difficult, whether these be economic in nature, comparative, political, military, or any other. And the Common Market certainly has great potential for this sort of effect. This is why they are writing so much about it and are so concerned about it.

The possibility that the Western European countries may show a more vibrant pattern of economic development than the Soviet Union has similar implications. However, as Mr. Hoffman noted, it is one thing to think of helping an advanced country get started again but it is another thing to get an underdeveloped country started in the first place. The problems for the underdeveloped countries will, I think, be neither nearer to solution nor further away simply because the Common Market has succeeded or Western Europe has succeeded in realizing the potential of an advanced industrial economy.

Representative BOGGS. Thank you very much, gentlemen.

Mr. Widnall?

Representative WIDNALL. I would like to direct this question to all of the panel. The title of this discussion has been "Dimensions of the Soviet Economy and Trade Offensive." Actually, we have not talked about trade offensive or our own economy. Have not most of their efforts been expended in the durable goods field, rather than consumer products? Steel particularly?

Mr. ROYSTER. Are you speaking of our exports now?

Representative WIDNALL. Yes. I am talking about competition for business overseas between the United States and the Soviets. Do you have any comments to make on that? I do not see anything in the papers about it.

Mr. ROYSTER. My own comment is that primarily, it seems to me, the areas in which the Soviet Union has been able to have any real competition with the Western World, excluding now the satellite countries, where they have a sort of captured market, has been primarily either in raw materials—petroleum, for example—or occasionally in a few basic commodities such as steel. I know, myself, of no real instance where the Soviet Union has been a real competitive factor, even in the machine tools industry, which they are putting great emphasis on, in the general world market. I would certainly put my money on the Germans to stand up to the Soviet Union in the field of machine tools.

In the consumer goods area, I know of practically no consumer goods commodity in which the Soviet Union today is in the position to compete with anybody.

Representative WIDNALL. In other words, the real foundation for any of their trade is barter rather than sale. Is that not so?

Mr. ROYSTER. Yes, that is correct. And mostly they are exchanging, as I say, raw materials which they do have some surplus of, or that they can make a surplus of, and occasionally they have exported some basic steel—not processed, shaped steel, but just basic steel—in return for manufactured goods of one kind or another. It is essentially a barter transaction, that is correct.

Representative WIDNALL. So that the competition from the standpoint of trade would not be based so much on quality, delivery date, credit, or anything like that, but quid pro quo back and forth by way of trade in goods?

Mr. ROYSTER. None whatsoever, I would think.

Mr. THORP. I think there is one angle to this that would not, naturally, occur to Mr. Royster, and that is that Soviet trade with China was very largely machinery trade. That one does not really think of in the same sense as other foreign trade. At any rate it was not competition with us.

Mr. ROYSTER. That is right. I was excluding, I said, satellite areas, but I really meant to exclude the whole Sino-Communist bloc. It is when you get into world trade.

Representative WIDNALL. It seemed to me that one of the things we must consider in connection with recognition of Communist China is that we would get into a world trade consumer goods there by way of price, which we do not have in competing with Russian products today. Is not this so, would we not be in an entirely different field, businesswise? In the textile business, for instance. China can undersell any country in the world.

Mr. ROYSTER. Well, by and large, the textile industry is one of the first industries that grows up and develops in any of the so-called underdeveloped countries. This is a standard pattern in the history of underdeveloped countries that are beginning to come forward, because textile machinery itself is quite simple, very simple to operate. It does use more labor than most other comparable manufacturing operations, and the labor is cheap.

So I would say, projecting it to Communist China, that they would very definitely be a competitive factor in textiles if they really wanted to be. But I consider textiles almost a case by itself because of this historical pattern. It is the common thing to have happen to textile industries, to move from the advanced countries to less advanced countries.

Representative WIDNALL. That is true, but we would certainly be asking for it if we got involved in it.

Mr. THORP. Well, all this would mean is that we, having decided what we can tolerate in the face of expanding Japanese and Hong Kong and Portuguese and other sources of textiles, would have one more claimant to consider, I suppose.

Mr. ROYSTER. Yes.

Mr. THORP. I do not think the Chinese could necessarily undercut these others, although it is certainly true that in any Communist

country, because of the way in which they handle their accounting and their methods of pricing, they could sell anything abroad that they wanted to if they had some reason for doing it.

Mr. ROYSTER. I do not want to get into the political question of China, but I would like to point out that, with or without recognition, there is nothing to stop Communist China if they so organize, to export textiles anyway.

Representative WIDNALL. They are doing it today.

Mr. ROYSTER. That is right, in much larger quantities if they wanted to.

Representative WIDNALL. That is all. Thank you very much.

Representative CURTIS (presiding). I have one general question that is in the nature of an observation for comments because the subject matter is dimensions of the Soviet economy. It strikes me that the key to the European Common Market is the fact that it is a mass market in which the efficiencies of mass production can be realized.

But I think sometimes we forget that mass production can only survive economically if we have mass distribution and mass servicing. As our society has been moving forward, the economic growth has been so rapid that we are creating problems of growing pains, not as most economists seem to look at it as tired and sluggish. This growth has primarily been in distribution and service. In fact, even in periods of recession, service, and distribution employment has increased. Manufacturing has declined and, in the manufacturing sector, it has been all in the blue-collar area.

Now, in relating this to Russia, it seems that the only real mass production they are experiencing is not for the people, but for the state, and as we look at the transportation and communication facilities, which are the essence of distribution and service, I think we begin to realize that they are decades behind in being able to develop this kind of mass market which Western Europe, with the European Common Market, seems ready to do if it can get rid of the political barriers.

As I say, I make that comment for anyone on the panel to comment on.

Mr. THORP. I think there is one interesting difference between the discussions of the Soviet bloc of countries and the Common Market. The Common Market discussion has been, as you described it, in terms of the advantages of the mass market, of a larger number of competitors, and of the absence of barriers. The discussions up to now in terms of the Soviet bloc group have tended to be much more in terms of the allocation of specialization to this or that country, so that some one country might work more in this particular area and trade the product with other countries. Their planning seems to be intended to break down the idea that each country should try to be self-sufficient, which is an early Communist idea.

Representative CURTIS. Was it your paper that pointed out that the trade between the satellite Communist countries was more their sending back finished goods?

Mr. THORP. Yes, that is right.

Representative CURTIS. And the Soviet Union was shipping raw materials?

Mr. THORP. That is right.

There has to be some further development of this. As you can imagine, one of the worries about the Common Market is a very direct and practical one. Poland and East Germany have traditionally shipped agricultural products into the Common Market countries. This would be a real problem for them if this area developed self-sufficiency, itself, in agriculture, and they were no longer able to earn foreign exchange by this method. So the Common Market is not just a matter of something that is going on in the neighbor's house that they are interested in. It has very direct impact on their own ability to earn foreign exchange.

Representative CURTIS. Thank you.

Mr. EASON. The only comment I would make is that when we speak about a market in Europe and elsewhere, we are speaking of a system within which businessmen and individuals make their individual decisions in reaction to prices and other considerations, and we hope that the market as such will be a mechanism through which growth will be enhanced and standards of living raised. The totality of the Soviet Union has the dimensions of a potentially large "market." But it must be remembered that decisions on growth and expansion are not made by individuals but by the planners. If Soviet policy dictates a move in the direction of consumer goods, then they will have to improve their distribution network, and so on. The market and the people are there in a special sense waiting for the appropriate decisions at the highest level to swing into consumer goods and away from heavy industry.

Representative CURTIS. Dr. Thorp's point was, even if they decided that, they would have to develop transportation. How much money have we sunk into roads and so forth?

Mr. EASON. Oh, yes.

Representative CURTIS. Do you have any comment, Mr. Royster?

Mr. ROYSTER. No, no comment.

Representative CURTIS. Thank you again, gentlemen.

I want to announce that we shall stand adjourned until 2 p.m. tomorrow, when the subject will be, "Policy Aspects of the Soviet Economic Offensive."

Roger Hilsman, Director of the Bureau of Intelligence and Research of the Department of State, will be the witness, and then we shall have a panel discussion on political objectives and problems of Soviet economic policy. The members of that panel will be Holland Hunter, professor of economics at Haverford College; Philip E. Mosely, director of studies, Council on Foreign Relations; Warren Nutter, professor of economics, University of Virginia; and John Scott, assistant to the publisher of Time magazine.

Thank you again, gentlemen. The meeting is adjourned.

(Whereupon, at 4:15 p.m., the hearing recessed until the following day, December 11, 1962, at 2 p.m.)

DIMENSIONS OF SOVIET ECONOMIC POWER

TUESDAY, DECEMBER 11, 1962

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The joint committee met pursuant to recess at 2 p.m. in room AE–1, U.S. Capitol Building, Hon. Henry S. Reuss (acting chairman) presiding.

Present: Representatives Reuss (presiding) and Boggs.

Also present: Wm. Summers Johnson, executive director, and John Stark, clerk.

Representative REUSS. The Joint Economic Committee will be in order.

This afternoon we have the second and concluding session of our hearings on recent developments in the Russian economy.

We have some additional studies prepared by experts on Russia, which were not available at the time of the original publication of our committee print, "Dimensions of Soviet Economic Power"; and without objection I offer and request incorporation in the appendix to these hearings of "Balance of Payments of the U.S.S.R," by Marcello Caiola; "The Soviet Challenge to U.S. Machine Building," by Michael Boretzky; and a revision of Prof. Herbert S. Levine's earlier article entitled "Recent Developments in Soviet Planning."

Our first witness today is Mr. Roger Hilsman, Director of the Bureau of Intelligence and Research of the Department of State.

Mr. Hilsman is well and favorably known to the legislative branch because of his brilliant work at the Legislative Reference Service of the Library of Congress.

We are very happy to have you back with us, Mr. Hilsman.

I understand you have a prepared statement. We would like to have you proceed in your own way.

You might introduce your colleague.

STATEMENT OF ROGER HILSMAN, DIRECTOR, BUREAU OF INTELLIGENCE AND RESEARCH, DEPARTMENT OF STATE

Mr. HILSMAN. Mr. Herbert Block, of the Bureau of Intelligence and Research of the Department of State.

Representative REUSS. You are very welcome, Mr. Block.

Mr. HILSMAN. Mr. Chairman, it gives me great personal pleasure to be here, not only to be back on Capitol Hill, even if only for a brief period, but also because I have been long impressed with this committee's excellent studies comparing the economic strength of the United States and the Soviet Union, of the free world and the Soviet bloc.

As you know, the Soviet economy has grown quite rapidly in the years following its postwar reconstruction. Since Stalin's first burial, i.e., in the last 10 years, the U.S.S.R.'s national product has grown by about 6 percent in the annual average. I may add that a figure like this is an approximation. Despite all statistical refinements, we do not have a perfect speedometer, nor does it matter whether the growth rate was a trifle higher or lower.

What is interesting about this figure is not that it is so high, but that it is so low. Considering the enormous efforts and sacrifices forced upon the Soviet population, one should have expected a faster rate of progress. As you well know, some Western European and Far Eastern nations have achieved faster growth with less privation.

This leads to a few reflections on the impulses and repressions that determine the character of the Soviet economy. Looking on the Soviet economy with the greatest objectivity possible, one is impressed by its split personality, its unbalanced, even schiziod nature.

Let me begin with a basic feature, the degree of rationality it displays. The Communists claim to have overcome the so-called anarchic nature of the capitalist market economy; they have substituted a fully planned and fully controlled command economy based on the so-called scientific laws of their own doctrine. But do they run that economy in a way that is rational and reasonable?

Consider how decisions are made on the ultimate use of labor, capital, and other resources. In the West it is the sovereign consumer and the sovereign voter who determine the way the national product is created and spent. In the U.S.S.R—and other Soviet-type societies—decisions on what should be allotted to national power and national welfare, what specific welfare aims should be pursued, these and similar decisions are made in secret by the leader and his intimates. Parliament is nothing but a sound board and rubber stamp, and the population is simply the perforce admiring audience.

Consider, second, the way the decisions on ultimate resource use are implemented. In the West this is done, by and large, through the pricing mechanism of the market. The market provides rational guidance for an infinite number of consumers and producers. The system is not without flaws; still it provides satisfactory results under present conditions.

The Soviet method of allocating resources, however, is anything but rational. Soviet prices are based on a faulty and antiquated theory, namely, the Marxist labor value theory; by neglecting the charge for capital services, the Soviet system has provoked a systematic waste of capital. Soviet prices are shot through with either windfall profits or with losses, and since they are not fit to steer the economy, they are neglected in favor of planning in physical terms of mass, weight, and bulk of product. The decisions thus made may vary from ultra-conservative to extravagant; in any case they involve a needless waste of valuable resources.

The Soviets have finally awakened to these realities, and a rather fuzzy discussion is going on as to what could be done to introduce a rational steering mechanism into their planned economy. No progress has been made up to now, and Khrushchev's latest speech, while promising that all useful proposals should be studied, continues to blame waste, lack of progress, faulty coordination, and corruption

on administrators and managers who, after all, have been under his guidance and control for almost 10 years.

The Soviet economic system—as has been candidly acknowledged by Oscar Lange, the well-known economist who heads the Polish Economic Council—the Soviet economic system is in the nature of a war economy. It creates the sinews of power; for power, not welfare, is its primary goal, and in a gamble for power, costs are secondary. The economy grows all right, but not as much as the exertions warrant.

What I have just said leads to a second and equally basic imbalance in the Soviet economy or, I should perhaps say, the Soviet economies, because there seem to be two of them. There is, on the one hand, the economy that produces ultramodern space vehicles, efficient blast furnaces, and many other complex and high-quality elements of armament and armament-supporting industries. This is the well-developed basis of the U.S.S.R. as a great power, and in this connection notice that Russia has been a world power—for close to three centuries—long before the Communists took over and had a respectable industrial and scientific substructure.

At the same time, there is another Soviet economy. This economy provides the Soviet population with housing space far below the sanitary standard even of the 19th century, with shoddy and tasteless manufactured consumer articles, and with a starchy and monotonous diet unfit for a modern industrial society.

There is a schizoid agriculture composed of nearly 50,000 superfarms and millions of kitchen plots, the ones too big, the others too small, all of them insufficiently provided with farm supplies and spurred by the wrong type of incentives.

In the industries providing consumer goods and services, you will find corresponding defects. You have a planned economy, but it is irrational—is planned on two levels, and the two levels are out of balance. You have a great economy, and yet a great poverty.

It has been said, occasionally, that Khrushchev faces heavier pressures in his decisions on resource allocation than Stalin. Let us understand correctly what this means, if anything. The Soviet national product has almost doubled since the early 1950's; hence there is much more to distribute. But all the demands on the pie—defense, space programs, and so on—have also gone up.

There is no doubt that living and working conditions have improved since they emerged from the lower depths of the Second World War, and since the Stalin era ended. But the improvements are not sufficient. Economists, as you know, differentiate between living standards and living levels, between the well-being rightfully desired and the well-being attained.

The much-discussed revolution of rising expectations has caught up with the Soviet Union. The bloc population and the Soviet people in particular are quite well informed now about life in the West. They are neighbors of Western Europe and have become aware of its growing prosperity. They know that the gap between Eastern and Western European living conditions is widening. And a new generation is slowly taking over in the East, a generation starved for creature comforts and fed up with sterile ideology.

The Soviet leaders are aware of these demands. Khrushchev, in particular, I think, wishes to satisfy them to a degree, not only because greater well-being promotes labor productivity, not only because it might enhance the attractiveness of the Soviet system abroad, especially in the underdeveloped countries, but simply because social and political pressures are registered even in a totalitarian state.

You have to be careful about how you say this "register," and realize that the political situation is a complicated one, and yet it still remains that social and political pressures are registered.

But the problem does not lend itself to a quick and facile solution.

The welfare of the Soviet population has been neglected so thoroughly and for so many decades that a rise even to present Western European levels will take a long time. It is true that precisely in the field of consumer goods and services, the U.S.S.R. could take over from the West, and the United States in particular, a large amount of organizational and technical know-how.

But welfare orientation instead of power orientation, an attitude of catering for the consumer instead of mechanically fulfilling plan goals, presupposes a profound psychological change in Soviet administrative and managerial habits which is not easily accomplished. It also presupposes enormous investments over a long time in housing and civic facilities, in agriculture and consumers' goods industries, and in the industries producing plant and equipment for consumer industries and services. These investments would have to be made at a time when military and space programs have become more costly than ever.

The net outlay for foreign aid both inside and outside the Communist realm must be mentioned among the claims that press for satisfaction. Measured in terms of the national product, Soviet foreign aid constitutes a minute amount, but even so it is anything but popular either among the managerial class or in the Soviet population.

In fact, the Soviets have carefully left their people in the dark on the scope of their foreign aid programs. Politically, Soviet foreign aid seemed to pay off handsomely while it was a novelty. By now Soviet expectations must have paled considerably, except that the U.S.S.R. can no longer extricate itself; foreign aid activities have become a lasting feature of the contemporary scene.

Which brings me to the last section of my remarks. It has to do with the interaction, the unavoidable interaction, between this country and the U.S.S.R. I am not so much thinking about the present and future ratio of Soviet versus American national product and its more or less mechanical projection into the future. The ratio is now roughly 45 to 100, and whether, by 1970, it will be 48 or 50 to 100 really does not matter greatly; the change in the ratio is likely to be minor.

Much more important is the impact that America, as a dynamic body politic, has and will have on the U.S.S.R. and its policies. Foreign aid is a case in point. Without our initiative in this field in the years after the war, the Soviet Government would not have dreamt of extending aid to less-developed countries; our actions in this field—and I may add Western Europe's contributions—will, whether Moscow likes it or not, have a decisive influence on future Soviet allocations for such purposes.

The same is obviously true of the U.S.S.R.'s programs for military and scientific ends. These, in turn, will determine how much will be left for investments, in particular for investments that more or less directly will benefit the consumer. It will finally determine how much will be available for immediate consumption.

We do not wish to doubt a further rise in Soviet living conditions, but the Soviet—and Soviet bloc—population is closely watching developments in American and Western European standards and levels of living, and the degree to which the gap will narrow or widen will have a profound influence on the political climate in the U.S.S.R. and in the bloc.

This might also be emphasized by the activities of the Common Market, I might say.

The paradox of an irrational planning system, the spectacle of grievious scarcities in an economy which boasts of its rapid growth, these and other Socialist contradictions have already engendered in the bloc countries a healthy doubt of the soundness of the command economy, collectivized agriculture, and other basic institutions and policies of Marxism-Leninism. Nor can the schizoid character of the Soviet economy be healed by creating a new set of agencies or replacing a number of top officials. The remedies will have to be much more radical.

Communist diehards have recently been lavish with the Marxist epithet "revisionism," which they apply to any attempt at reform in Soviet-type societies. Khrushchev and other so-called revisionists, in the Communist world of today, would blanch if they could see ahead the revisions which the 1960's will force upon their system.

That ends my statement, Mr. Chairman.

Representative REUSS. This is an extraordinarily interesting account of things as they are in the Soviet Union's economy. You pointed out, very well, the great lag in what you called the second economy, the economy devoted not to production of military goods and scientific goods, but devoted primarily to the consumption economy.

You have also pointed out the difficulties Marxist-Leninist economics have had with allocating resources, especially between various forms of producers' and consumers' goods.

However, before we start getting too complacent about this rather grubby picture of Soviet performance in the second, the consumers' economy, I wonder if we should not hear from you as to what the revisionists have up their sleeves.

For example, you mentioned Oscar Lange, who is now head of the Polish Economic Council. Oscar Lange is an extraordinarily astute economist. I should think—although I am not familiar with what he has been saying recently—that people like Lange would have done some keen appraising of the defects of Soviet economics as practiced today and would have some ideas on how they can make the system less inefficient, consistent with the degree of state direction which is inherent in the system.

I would be amazed if they did not have plans for taking people off the farm, for example, since this has been one great source of Western industrial productivity increases in recent years. I would think, too, that behind all this facade of talk by Khrushchev and

others about better things in sight for consumers, they would be in the process of evolving some signals and determinants for deciding who gets what.

I would like to hear from you on that, if you have any thoughts on it.

Mr. HILSMAN. Well, I do. I really would like to make three separate points.

It is perfectly true, I think, that the revisionists have things up their sleeves. And I might mention the so-called market socialism and change in agricultural institutions, although there is no evidence of any changes yet.

But my second point would be that I do not want to overestimate, or I do not mean overestimate, but mislead anyone, that I feel that the demands of the mass of the population have any simple 1-to-1 relationship with the allocation of resources in the Soviet Union.

I think that the politics of the Soviet Union are a complex matter. It is perfectly true that through the elite and through the need to keep the secret police, the army, the party bureaucrats, and the intelligentsia reasonably content, in order to balance off these political forces, there has got to be some satisfaction of consumers, of these consumers at the very least. This is true. But the political dynamics of this, as it works in the Soviet system, permits the leadership a great deal of flexibility.

What I am adding up to is that I think it would be very complacent of us to think that because the mass of the Soviet population is aware of the difference in living standards between themselves and the rest of the world, this will force Khrushchev to sacrifice many of his power goals.

I think he is perfectly capable of managing this through the apparatus of a Communist police dictatorship. The politics exist, but they are complex politics, and there is a great deal of control and maneuverability in the leadership.

That would be my second point.

The third point is that I do not think that we should ever underestimate, when we talk about revisionists, in the economic sphere or any other, the difficulty that this causes trained Communists.

The leadership—and I am not talking just about the top leadership, but the Communist parties, of these various countries—have a process of developing leadership that both chooses a certain kind of personality and attracts that same kind of personality. Then the personality is trained as he comes up through the hierarchy of the system.

There are elements in here, and I am thinking now of the work of a man like Nathan Leites in his study of bolshevism—there are elements here of something that goes very deep into the structure of the personality, about the nature of the world they live in and the interaction and dependence of human personality on this world that they live in. These things do interact.

And I think that too much decentralization begins to disturb a Soviet personality, a personality that has grown up in this system. If you grasp this, you begin to understand some of the real seriousness of the present Sino-Soviet dispute. It goes to the organization of the Communist bloc, the texture and context of the world that they have created, the kind of life they lead.

So I think that it makes people nervous in the Communist bloc when Communists or revisionists or anyone else start talking about very fundamental changes in the structure of the system, including agriculture.

For example, a real decentralization relying on the price structure in the agricultural sector I think would begin to have these kinds of ideological and even psychological uneasiness.

That was rather a long answer, Mr. Chairman.

Representative REUSS. I was struck yesterday by Mr. Royster's testimony. He is the editor of the Wall Street Journal and was in Russia last summer. He testified that 17 Russians are required to tend a herd of pigs of a size that could be tended by 3 American swineherds.

You would think that somewhere somebody in the apparatus would be trying to evolve a method whereby, consistent with the general state-directed system, you could get some of the surplus swineherds into the cities, making consumer goods.

I grant that the Soviet Union is not likely to decrease the absolute volume of its resources which it devotes to military and near-military production. It is in the second economy, the civilian economy, where a more rational organization could produce vastly better results; and since at least some of the people in the Kremlin are practical politicians who want to be popular, I would suspect that maybe they are closer to some economic revisions than we think.

But your answer was that you think they have gone about as far as they feel they can go in the way of decentralization, in the way of giving farmers, let us say, a price incentive to produce more, and thus surplus labor is not likely to be spilled into the cities in order to provide increased industrial production.

Mr. HILSMAN. Well, what I was trying to say is that I think that there are possibilities for improvements within the Communist ideology about their economy. I think there is undoubtedly room for structural changes that would have some rather far-reaching effects.

However, I am inclined to doubt that they will get to the very root of the matter. As I mentioned in my remarks, an entirely different attitude of mind, a price system, and the incentives that it brings.

I think, taking your example of the swineherds, you could argue this on several levels. One is the basic level of institutions and price sytem, which I doubt that they will ever—barring some really cataclysmic change in the Soviet society—bring themselves to.

At the same time, you could say that this particular example they might at least be able to reduce to 5 or 6, as opposed to the 17, by eliminating some of the inefficiencies of a bureaucratic way of handling agriculture by a large bureaucracy. I think we all realize that the incentives inside of bureaucracy are not high to reduce the number of people.

But finally, there is still another level that you might go to in this particular example, and that is: Even though you might see ways within the Communist structure of reducing the number of people to tend this one hog, you might be reluctant to go even as far as you are capable of going, because of, say, the problems of urbanization.

You set things in train. If you start moving people too fast from the farms to the cities, they already have a major housing problem, and this is a major reallocation of resources to housing and to all of

the things that are needed in the city to sustain people, the transportation needed to get food to them, and so on.

Representative REUSS. Turning to a new point, do you find evidence that the underdeveloped countries are impressed with and are attempting to imitate Russian economic methods?

Mr. HILSMAN. It is awfully hard to generalize about such a large number of countries as fall into this rubric.

I think I really am more impressed with the opposite. In the underdeveloped countries, and especially in the Asian countries—this is on the top of my mind right now, since I have just returned from this part of the world—I think the thing that impresses me most is that even in the case of those countries who take a "neutralist" stance, that in practice tend to be more leftist-leaning, more Eastern-leaning than Western-leaning—even in the case of these countries their stance on the international scene is more often than not quite different than their internal stance.

For example, even with India at the height of its neutralism, Mr. Nehru was very careful to sterilize and neutralize the Indian Communist Party, even when he was most friendly with the Soviet Union and Communist China.

Now, of course, after the Sino-Indian border trouble, he is not so friendly with the bloc even on the international level.

So I think really the opposite. I don't think they know too much about the internal workings of the Soviet economy. I think that the imitation of the bloc, the attraction of the bloc, comes really on a different level than the matters that we have been discussing today.

Unfortunately, the power aspects of the Soviet economies, the power economy, are terribly impressive in the underdeveloped world. The sputnik, the space feats, military power, all are impressive here.

I doubt that there is a very complete and full understanding of the workings of the Soviet economy in the underdeveloped areas.

Representative REUSS. What can you tell us about the recent activities of the Soviet Union in economic warfare through the use of exports, particularly in disrupting commodity markets throughout the world?

I am thinking of things like the sale of oil at allegedly cut rates.

Mr. HILSMAN. Well, this has been a practice of the Soviet Union, as you know. I think that our judgment right now is that the Soviet economy at its present stage has a certain need for imports and hence a need for exports. I think this is a risky judgment to make when we get into these crystal-ball predictions, but I think for the moment at least Soviet dumping activities are going to be less than they have been at some periods in the past.

I think they have need for imports which will inhibit them in these particular practices.

Representative REUSS. They do not have foreign exchange to throw away.

Mr. HILSMAN. Exactly. They have to import a lot; so therefore they have to export.

Representative REUSS. We have heard much recently in the press about basic political differences between the Chinese Communists and the Soviet Union. What can you say about the differences, if any, in the economic approach of the two countries?

Mr. HILSMAN. Internally? Or in their attitude toward the rest of the world?

Representative REUSS. Well, let us hear you on both.

Mr. HILSMAN. Both.

Well, following right from your previous question of the attitude toward the underdeveloped countries in the world, as you know, the Soviet Union embarked on a program of foreign aid really in conjunction with a policy of encouraging neutralism in various parts of the world.

The Chinese Communists made a certain attempt to follow in their footsteps, but really found that it was too much for them, and abandoned this.

And this leads us right into the heart of the Sino-Soviet dispute, because there has been in this dispute not only a quarrel about ideology, a quarrel about the organization of the bloc itself, about where power shall lie; there has also been in this dispute an argument about the policy the bloc shall follow toward the underdeveloped part of the world.

The Soviet Union has been following the policy of peaceful coexistence, which means foreign aid, encouraging neutralism, and so on, and the Chinese have been arguing for a more aggressive, more power-oriented policy, more of a policy that contains a military threat, and none of the foreign aid, and so on.

So this is really its answer. The Chinese Communists have not adopted this kind of a policy. Their policy has been a much harsher, much tougher, much more aggressive policy, not only toward the West, toward the United States and the rest of the world, but toward the underdeveloped countries themselves.

On the other hand, the Chinese Communists have a need for imports, a very substantial one. They have a need for a great deal of oil. Of their imports of oil, virtually all of it does come from the Soviet Union. And one will watch with interest the fluctuations of these oil imports from the Soviet Union as this dispute progresses.

They also have a need for food, for wheat. And here they have been buying a great deal of it. This has cost them a lot in terms of their whole economy. But they have a need for trade, therefore, especially in oil and in food.

Internally, we have watched a great leap forward in the industrial sphere, which was a colossal failure. We have watched a large-scale attempt at communes, agricultural communes, which has failed.

It has gotten them into serious trouble, and we saw some of the repercussions of this in the flood of refugees earlier this year into Hong Kong out of China. It was not that these people were starving at the time, but it certainly was that they were anticipating that they would be starving sometime during this coming winter. And this, too, we will have to watch.

Reports coming out of Communist China right now show grave economic difficulties, a shortage of raw materials, factories idle because of the shortage of raw materials, underemployed and unemployed people in the cities, reluctant to be pushed back on the farms, with the Government trying to force them back on the farms.

This, too, I am afraid, all of these factors, are going to have their effects in the international sphere in the foreign policy of Communist China.

Representative REUSS. Trade between the Soviet Union and the Common Market countries and other Western European countries has, I believe, been increasing in the last 2 years. Is that your impression?

Mr. HILSMAN. With credits. With credits, as opposed to trade. In favor of the Soviet Union; that is correct.

Representative REUSS. Credits extended by the Western European countries?

Mr. HILSMAN. Yes.

Representative REUSS. What guess can you make about the future of East-West trade?

Mr. HILSMAN. Well, certainly it is perfectly clear that the Soviets themselves are very nervous about the Common Market. They have been trying to jack up CEMA, that held a number of meetings on this.

Representative REUSS. CEMA?

Mr. HILSMAN. The Communist equivalent. This really goes back further. It was established in the period following the Marshall plan and really is a counteraction to it.

But they have been increasing their emphasis on it recently, and one thinks as a counteraction to the Common Market.

Let us say the bloc equivalent of the Common Market is the way they think of it, I think.

You see evidences of this sort of nervousness on the part of the Soviet Union. On the other hand, a sound Common Market should increase import needs and export availabilities. It does not necessarily follow that it is trade trouble for the Communist bloc.

Representative REUSS. Do you have an opinion as to whether expanded trade in nonstrategic goods between Western Europe and the Communist European bloc is in the interests of the West, leading to greater flexibility and mobility and the possibility of political relaxation? Or is such trade against the interests of the West, because it builds up the Soviet bloc?

Mr. HILSMAN. Mr. Chairman, I was raised in the free trade school that trade resulted in everybody being better off. So let us say my instinctive bias is toward free trade everywhere in the world.

But I would be very skeptical of one aspect of this, and it touches on what you mentioned earlier, and that is the Soviet practice of dumping.

Though theoretically, in other words, in favor of free trade everywhere, I would have grave doubts about the longrun stability of such a relationship. Certainly many of the nations who have entered into trade with the bloc in the past have come to be disappointed eventually.

There have been some short-run gains for some of them, but in the long run a sudden switch-off of trade, a dumping practice, any number of political decisions, which the Soviets are often injecting into every relationship, have led to disappointment.

I think if I were the leader of a Western nation, of one of the smaller nations, I would hesitate to see my economy become dependent on a trade relationship with the Soviet Union, in view of this past history, because of the possibility of a major unsettling at some future time for some political decision, as a result of some political decision. Hence, I would have a healthy skepticism of it.

If the relationship, the trade relationship, did not involve that kind of a dependency, making investments that depended upon this market continuing in a stable way, then I think it might possibly be beneficial.

Representative REUSS. Of course, the free world is having its own difficulties with changing trade patterns, both those brought about by alternating scarcities and gluts of basic materials from the underdeveloped countries, and those brought about by various political and economic groupings such as the Common Market. Is this not so?

Mr. HILSMAN. That is true. But I would think that the Common Market, because of the nature of the governments involved, the nature of the economies involved—they are, after all, price system economies. The political decisions are democratically arrived at.

It seems to me that because of these factors entering into a relationship with the Common Market on the part of an outsider, it does not involve the same risk of a reversal for political reasons, power reasons, as it does with the Soviet Union.

Representative REUSS. Thank you very much, Dr. Hilsman. We appreciate your being with us this afternoon.

Representative REUSS. For our next witnesses, we have a panel of distinguished scholars, all of them with intimate knowledge of Russia. I will ask Mr. Hunter, Mr. Nutter, and Mr. Scott to come up.

I understand Mr. Mosely, who is also on the panel, is not yet here. When he arrives, we will ask him to join you.

The first witness is Dr. Holland Hunter, professor of economics at Haverford.

We are happy to have you with us, Dr. Hunter.

You have a prepared statement, which will be received; and would you proceed in your own way, either to paraphrase or summarize your statement.

STATEMENT OF DR. HOLLAND HUNTER, PROFESSOR OF ECONOMICS, HAVERFORD COLLEGE

Dr. HUNTER. Thank you, Congressman Reuss.

If it is permissible, perhaps I could simply submit that statement and make a few additional comments.

Representative REUSS. May I suggest that I think it would be most useful if you can summarize it, because among other things, we may want your colleagues here on the panel to comment on the key points that you make. So if you could combine a summary of it and the addition of whatever you care to add, I think it will be most helpful to us.

(Dr. Hunter's prepared statement follows:)

STATEMENT BY HOLLAND HUNTER, PROFESSOR OF ECONOMICS, HAVERFORD COLLEGE; RESEARCH PROFESSORSHIP, BROOKINGS INSTITUTION; RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY

The Joint Economic Committee's reviews of Soviet developments have come to be major aids to American understanding, and the papers I have seen in the present collection indicate that this new set will be extremely useful. There is also some educational value in an exchange of views before this august committee, especially from men like those flanking me. The subject, however, is vast, and our discussion—necessarily impromptu—cannot be definitive. In fairness to the authors of these background papers, it should be clear that members of the panel have not had time to study the papers with care. And in fairness to everyone here today, we should remind ourselves that the administrative

changes currently underway in the U.S.S.R. are so very recent that our evaluation of their significance must necessarily be extremely tentative. My own preparation for these hearings has benefited greatly from the observations of several scholars at the Russian Research Center, Harvard University, but I do not in any sense represent them or the center.

These brief remarks come in two parts. First, some problems that arise in evaluating comparisons are illustrated in the current Soviet context. Then a few comments are offered on some of the underlying papers, especially as they touch on the size of the Soviet gross national product and on indexes measuring the rate at which its industrial production is growing. The outcome is a net impression that the Soviet economy will continue to move forward rapidly in the 1960's.

I. THE INCOMPLETE COMPARISON, FIVE TYPES

Reviewing the performance of an economy is a numbers game, which, like others, has its dangers. Both Soviet propaganda and Western popular commentary frequently use vivid language involving comparisons that are ambiguous or unstated. It is therefore important that we be clear and explicit in specifying the numbers we are comparing when we make our judgments. Without being exhaustive, I might illustrate the dangers of "dangling comparatives" in five different connections.

A. Current absolute levels

Soviet production generally increases from year to year, but recently the absolute level of output has declined for some products. Coal production, for example, was 513 million metric tons in 1960, and 511 million in 1961. Is this a sign of crisis? It is not, because the U.S.S.R. is belatedly moving away from coal toward use of oil and gas as fuels; the latter are growing more rapidly than anticipated and fuel shortages are not a current problem. By contrast, the absolute fall in the level of agricultural production after 1958 has created some major problems for the regime, as we know. Yet even here the declines have not created a crisis like that confronting the Communist Chinese, and we would do well to maintain a due sense of proportion.

B. Current rates of growth

While absolute levels of production in the U.S.S.R. have continued to rise, the percentage rate of growth from one year to the next has typically been lower than it was a few years ago. This fact is central to our analysis of Soviet prospects. But the reduced growth rates lead to varying degrees of concern on the part of Soviet authorities. For example, the drop from a 17-percent rise in cement production during 1960 to a 12-percent rise in 1961 is clearly unfavorable, yet the 3-year rise since 1959 has been 48 percent (if the 13-percent increase for 9 months 1962 applies to the whole year), and a 47-percent rise in the next 3 years will bring cement output up to the 1965 target. Production of synthetic fibers, on the other hand, is rising some 11 percent in 1962, compared to annual increases of 17 percent in 1960 and 18 percent in 1961; growth in the next 3 years will have to be more than 2½ times as rapid if the 1965 target is to be met. Concern with the whole plastics situation has recently led Khrushchev to give top priority to its improvement.

C. Relevance in comparisons of international standing

Without going into the complexities of measuring the relative positions of two different economies, I might illustrate the problem of finding relevant comparisons by citing a striking Soviet device for minimizing the true dimensions of their housing shortage. The Soviet people are no doubt reassured to see in the 1960 statistical handbook that 2,912,000 apartments were built in the U.S.S.R. in 1960, compared to 1,180,000 units in the United States, including Alaska and Hawaii. The handbook does not indicate, however, that over three-quarters of these units are single-family houses, or that even the apartments are much larger than what is now being built in the U.S.S.R. Other similar examples could be cited. But the relevant comparison is not always easy to agree on. For instance, Americans frequently consider urban Soviet citizens, very few of whom have cars, to be deprived. Yet excellent bus and subway service, as in Moscow, may go far to offset or remove the apparent deficiency.

The fact that Japanese and West German growth has been more rapid than Soviet growth in the last decade is an important demonstration that dictatorship is not a necessary condition for rapid progress. Under favorable condi-

tions, freedom and public welfare can thrive as output expands. In the 1960's, as Stanley Cohn shows (p. 87), many allegedly decadent economies will be growing, from already high levels of per capita income, at impressive rates.

This growth of the advanced economies, along with the U.S.S.R., has been more rapid in recent years than the economic growth of most low-income economies, especially those where population is also growing rapidly. Roughly speaking, the rich countries are pulling away from the poor countries. The political strains to be anticipated from jostling among advanced countries as they move forward will surely be complicated by, and will perhaps be outweighed by, the strains arising between the high-income countries as a group and the poor countries that are falling even further behind. Sound policy will require thoughtful attention both to the opportunities and responsibilities, and to the dangers that lie in these complex relationships.

D. The problem of "budget" (it will be)

Evaluation of Soviet reality, under conditions of rapid growth, faces a problem of pinning down the dates of particular developments, especially those that are underway. Frequently Western observers are fooled, like the Russians themselves, into treating proposed projects as though they were already on hand. Let me give two examples. In the fall of 1959 the U.S.S.R. announced plans to build some oil pipelines joining the Soviet Union with several Eastern European countries and potentially with Western European markets also. There were immediate political reverberations in many quarters, though, of course, no oil had yet been delivered through them. Nor has it to this day. Parts of the network are now being completed, and perhaps by 1964—5 years after the original excitement—the system will be in operation. In this case there has been ample time for adjustment.

For a second instance, consider the story in the New York Times of November 30, 1962, captioned "Soviet Union Undertaking Vast Program of Subterranean Study Using Holes Bored 9 Miles Deep." This is clearly in the present tense, and a casual reader could be forgiven for conjuring up visions of serious achievements, perhaps with implications for underground nuclear testing. Close reading of the dispatch makes it clear, however, that to date one oil well test hole has "reached a depth of more than 3 miles," while another is slated to go down more than 4 miles, almost as far as a Texas dry hole drilled some years ago. Holes that are to go down 6 to 10 miles are part of a long-range research program. In this case the development is really just appearing on the horizon.

E. Planned versus actual performance

The term, "failure," should be very cautiously used in connection with underfulfillment of plan targets in the U.S.S.R. Remember that each year new annual targets are set, and that there is some optimum distance out ahead where they should be placed. The basic objective is change, not balance, and a noticeable degree of overcommitment has been considered by Soviet authorities to be a forceful device for stimulating controlled change. Under these conditions there will always be gains that fall short of targets, especially for items that have low current priority in the eyes of the authorities, and gains that go beyond some other targets, especially for items of very high priority. It the weighted average of overfulfillments and underfulfillments is substantially short of aggregate goals, one can conclude either that the set of targets was unrealistically ambitious, or that feasible targets are being missed because of genuine malfunctioning in the performance of the economy. It might be well to employ this distinction today in our evaluation of the current Soviet situation.

II. OBSERVATIONS ON SOVIET TRENDS IN INDUSTRIAL OUTPUT AND GNP GROWTH

The Greenslade-Wallace index of Soviet industrial production is a substantial contribution to our knowledge in this area. Developed independently of the Kaplan-Moorsteen index, it provides support for the latter and adds to the cluster of Western computations that now stand in fairly close agreement with each other, all showing lower growth rates than the official Soviet index.

The effort to extend coverage of this index to include merchant ships, civilian aircraft, electronics, and some added chemicals, is clearly welcome, especially since these are among the products whose rate of growth is above the average. The effect is to pull the Greenslade-Wallace index above the Kaplan-Moorsteen index after 1953. By 1961, the new index has a value of 267, taking 1950 as 100, while the Kaplan-Moorsteen index would—if carried forward—be in the neighborhood of 250.

It is also very helpful to have an up-to-date index covering the last 12 years continuously, since this provides a basis for judging Soviet prospects over the next few years that is more relevant, in my view, than any longer period can be. The post-1950 Soviet economy differs in many important ways from the Soviet economy of the 1940's or 1930's, to say nothing of earlier periods. The near future will develop out of the recent past, if we assume no sharp discontinuities, and the forces at work in shaping it are therefore to be found in this recent, relatively homogenous record. Splicing together the war and civil war period (1914–20) the recovery period (1921–28), the Stalinist growth period (1929–40), another war and reconstruction period (1941-49), and the recent cold war expansion period, does not seem to me likely to yield a valid basis for forecasting the next decade. I say this with full respect for the National Bureau of Economic Research study, directed by my friend Warren Nutter, which is a major contribution to our understanding of the Soviet past, compared with the American past. When the NBER study was launched, only 4 years of this 12-year period had transpired, and the heterogeneous long-period perspective had perforce to be employed. But now, for the specific purpose of estimating future prospects, we have additional evidence, not available even at the conclusion of the NBER project, and I would think, therefore, that primary stress should now be placed on post-1950 record.

Mr. Cohn's dollar estimates of the 1960 gross national product of seven major economies are courageous and interesting, as are his rough forecasts of each economy's possible growth rate during the 1960's. An evaluation of their plausibility would be a major task which I do not attempt here. I cannot resist, however, a brief computation showing what the numerical consequence of applying these growth rates to the 1960 positions would be for the 1970 standing of these countries. For simplicity a range of 4.0 to 4.5 percent for an average annual rate of growth is taken here as 4.25 percent. The four European economies he presents are also shown here as a group.

TABLE 1.—*Estimated gross national products, 1960 and 1970, for 7 major economies*

Country	GNP in 1960		Anticipated growth rate	GNP in 1970	
	Billion dollars	United States=100		Billion dollars	United States=100
United States	504.4	100.0	4.25	764.7	100.0
U.S.S.R.	235.5	46.7	6.25	431.9	56.5
4 European economies	306.2	60.7	4.7	484.6	63.4
West Germany	92.2	18.3	4.75	146.7	19.2
United Kingdom	85.4	16.9	3.75	123.4	16.1
France	84.8	16.8	5.25	141.4	18.5
Italy	43.8	8.7	5.25	73.1	9.6

Source: Cols. 1 to 3 from Stanley H. Cohn's chapter, pp. 76 and 87; cols. 5 and 6 derived therefrom.

It will be seen that, on this basis, the U.S.S.R. is estimated to advance from about 47 percent of the U.S. level in 1960 to about 57 percent of the U.S. level in 1970. The four European economies rise from about 61 to about 63 percent of the U.S. level. Taken together, these four European economies show a larger gross national product than that of the U.S.S.R. in 1960, and this is still true in 1970. If the other economies of Western Europe were added to the group, it would, of course, be even larger, but then perhaps the relevant comparison would require grouping the other members of CEMA with the U.S.S.R. Without making the estimates, one can still see that Western Europe has and will have major stature in relation to the Soviet bloc.

Dr. HUNTER. There are first some cautionary remarks about the importance of being clear on what we are comparing when we say things have gotten larger or smaller or better or worse.

The first point suggests that, for instance, if coal production goes down a little, it really is not serious, because the U.S.S.R. is switching

to oil and gas. On the other hand, when agriculture fell off, some products at least, that was serious, although not as serious as in China.

Secondly, I discuss declines in percentage rates of growth, and point out that some are serious and others are less serious.

Then I take issue with the Soviet way of comparing the number of apartments they build with the number of housing units we build. It turns out, of course, that our units, three-quarters of them, are single-family houses, and not two-room apartments.

Then I point out that the U.S.S.R. has been growing; and that, as Mr. Cohn's paper shows, many Western economies have also been growing. The striking fact is that these economies as a group have been pulling away from the really poor countries; while we may not consider the resulting problems today, they are, bound to be serious.

Then I suggest the importance of noticing when things are actually finished in the U.S.S.R., and give two instances of premature concern on our part.

The final caution is an observation that, although ambitious targets may not all be fulfilled, this is not necessarily a sign of collapse, or a sign of unimpressive growth.

I turn, then, to some observations on the trend of growth of industrial production and GNP. There is a passage here that should be read.

> It is also very helpful to have an up-to-date index covering the last 12 years continuously, since this provides a basis for judging Soviet prospects over the next few years that is more relevant, in my view, than any longer period can be. The post-1950 Soviet economy differs in many important ways from the Soviet economy of the 1940's or 1930's, to say nothing of earlier periods. The near future will develop out of the recent past, if we assume no sharp discontinuities, and the forces at work in shaping it are, therefore, to be found in this recent, relatively homogeneous record.
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> Splicing together the war-and-civil-war period (1914–20), the recovery period (1921–28), the Stalinist growth period (1929–40), another war-and-reconstruction period (1941–49), and the recent cold-war expansion period, does not seem to me likely to yield a valid basis for forecasting the next decade. I say this with full respect for the National Bureau of Economic Research study, directed by my friend Warren Nutter, which is a major contribution to our understanding of the Soviet past, compared with the American past. When the NBER study was launched, only 4 years of the 12-year period had transpired, and the heterogeneous long-period perspective had perforce to be employed. But now, for the specific purpose of estimating future prospects, we have additional evidence, not available even at the conclusion of the NBER project, and I would think, therefore, that primary stress should now be placed on the post–1950 record.

If you permit me, I would now turn to some observations on points that have come up this afternoon, and then turn to the table at the end of my statement.

Mr. Hilsman says it is interesting that the Soviet rate of growth has been so low, considering the enormous efforts and sacrifices forced upon the Soviet population. In this connection, one should note that the high rate of growth of Japan and West Germany is not unconnected with the fact that their military outlays have been very modest.

What is impressive about the Soviet record is that they have been able to keep the share of consumption in the national income so low for so long that both industrial output and military power have grown very rapidly.

My second comment relates to the rationality or irrationality of the Soviet economy. There are two senses, I think, in which we can criticize the Soviet economy's rationality. One can argue that an economy is irrational if it fails to serve consumers. In that sense, the Soviet record appears, from our point of view, from a humane point of view, certainly, gravely irrational.

But you can say that it has also been irrational in the sense that it has been very clumsy in the way in which it has been directed toward the regime's purposes. That is to say, it has not even been a terribly rational dictatorial economy.

This is an important distinction, because people like Oscar Lange and his counterparts in the U.S.S.R. are now trying to find ways to eliminate inefficiency and get an economy that will carry out efficiently the purposes of the regime.

Carrying that a little further, one could speculate that the recent changes in administration and organization show that Khrushchev is not yet ready to follow the suggestions of his technical economists; that is to say, he still apparently puts more confidence in capable, young, energetic administrators than in the arrangements for operating the economy that these economists are recommending.

I agree very much with what Mr. Hilsman said about the nature of the party-trained Soviet personality. That is relevant here, because there seems to be a kind of clash between what the Russians call party spirit, "partiinost'," and the technical problems of optimizing along many fronts. That is, the men who are running the economy see that where formerly they only had a handful of goals, they now have a large number of things to consider; they need a rational, and in some sense or other unideological, way of reaching decisions. But as Mr. Hilsman suggests, the party is not ready for that.

A brief observation on Soviet trade: There is a paradox, here, I think. If the U.S.S.R. increases the absolute volume of its trade, as it has been, and if this increase continues so that it really becomes significant on a world scale, then the U.S.S.R. will literally have to deliver the goods. Sustained trade is only entered into repeatedly if the trader brings himself under the discipline of the world market. Thus if the U.S.S.R. does that, there will be a retreat from the autarchic and purely politically dominated trade of the past decades.

If, on the other hand, Soviet trade continues to be primarily politically motivated, then it will be sporadic, and I would think much smaller in absolute volume.

Perhaps now I could end by commenting on the numbers Mr. Hilsman uses for the possible position of the U.S.S.R. in 1970, compared with the United States.

Clearly it is hard to be precise, but at the end of my prepared remarks there is a quick computation to see what is implied by Mr. Cohn's figures for the relation of the Soviet economy and other economies to the United States in 1960, and the growth rates that seem plausible for this coming decade; to see where they bring you out in 1970.

It is quite interesting. You see that, calculated this way, the U.S.S.R. advances from about 47 percent of the U.S. level in 1960 to about 57 percent of the U.S. level in 1970.

And combining together West Germany, the United Kingdom, France, and Italy, you see that they in 1960 are about 61 percent of the United States, and if they grow as anticipated, they would be about 63 percent of the United States in 1970.

This involves a growth rate for the United States of 4¼ percent per year; that may seem to some a little high, although it was achieved during the first half of the 1950's. If our rate of growth during the 1960's was 2½ percent per year, the growth for the decade as a whole would be 28 percent. Even under those conditions, the U.S.S.R. rises from 47 to 67 percent of the United States, and the group of four European economies rises from 61 to 75 percent of the United States. Perhaps I could end by saying this seems on the whole comforting.

Representative REUSS. Thank you, Mr. Hunter.

The next panelist is Mr. Warren Nutter, professor of economics at the University of Virginia.

You, too, have a prepared statement, Mr. Nutter. Would you proceed in any way you wish.

Mr. NUTTER. My knowledge of the Soviet Union is very specific and limited essentially to the economy, and I think that since my comments are also very specific, I will serve a better purpose by simply reading them to you at this point, instead of ranging over the various issues that have been raised. These we can take up later on.

STATEMENT OF G. WARREN NUTTER, PROFESSOR OF ECONOMICS, UNIVERSITY OF VIRGINIA

Mr. NUTTER. It is an honor to appear before this committee to comment on dimensions of Soviet economic power, another of the important studies you have sponsored on comparisons of economies in the Communist and non-Communist worlds. Since I have had only a week to look over the finished reports and to gather my thoughts on the subject, my remarks at this time will have to be essentially in the nature of first reactions on rather general matters. I offer them, nevertheless, in the hope they will be of some interest.

The present series of reports contrasts in one interesting respect with the one issued in 1959, in that the present reports seem to be written mainly by personnel from governmental agencies and not by academic specialists. This kind of balanced presentation of views is to be desired, and the committee is to be commended for promoting it. It is somewhat regrettable, however, that the ordinary reader is not given as much guidance as he might be on the variety of backgrounds represented by the different authors. In this regard, the reports issued this year would be more valuable if authors were fully identified, particularly in their professional attachments, as they were in the 1959 reports. I make this comment on the basis of the textual material I have seen, and the matter may be taken care of in introductory statements, in which case my remarks are not relevant.

One thing that is clear from comparison of the present reports with earlier ones is how much our knowledge of the Soviet economy has improved over the last 4 or 5 years, thanks in important measure to this committee's role in seeking out and publishing conflicting views. As knowledge has improved, views have changed.

Let me offer one example from the field of industrial growth, which I have followed rather closely.

In a speech given in the spring of 1958, Allen Dulles, then Director of the Central Intelligence Agency, said that:

> The Soviet economy has been growing, and is expected to continue to grow through 1962, at a rate roughly twice that of the United States. Annual growth overall has been running between 6 and 7 percent, annual growth of industry between 10 and 12 percent (New York Times, Apr. 29, 1958, p. 8).

A year later he said:

> During the past 7 years, through 1958, Soviet industry has grown at the annual rate of 9½ percent (ibid., Apr. 8, 1958, p. 8).

And 6 months later:

> We believe it likely that the Soviet will continue to grow industrially by 8 or 9 percent a year (hearings, JEC, November 1959, p. 9).

This story may perhaps be continued by referring to the report being submitted to this committee by Rush Greenslade and Phyllis Wallace.

They find Soviet industrial production of civilian goods to have grown at an annual rate of 10.1 percent over 1950–55, 8.7 percent over 1955–61, and 6.6 percent over 1959–61.

They hesitate to construct an index including military products, but they suggest an illustrative trend of total production that would change these rates to about 9.9 percent over 1950–55, 8.7 percent over 1955–61, and 7.5 percent over 1959–61.

While I would argue that these rates for the latter two periods are too high, that is not the point to be made here.

The point is that these rates are all significantly lower than those given in Dulles' speeches, despite the fact that he was steadily lowering his estimates. The difference is particularly marked between the projection of 10 to 12 percent through 1962, apparently made in the spring of 1958—though Dulles' statement is not entirely clear in that respect—and the current estimate of about 7.5 percent for 1961.

I do not wish to argue that improved knowledge has uniformly led to lowered estimates of Soviet economic growth, for this is not so. For example, estimates of recent trends in Soviet gross national product have not changed materially as more and more information has become available.

There is, however, a lesson to be learned from the history of assessment of industrial trends; namely, that U.S. analysts have leaned toward overstatement of Soviet performance when the data left room for doubt. I think this remains true in several of the reports presented this year.

Let me cite two or three instances.

In his informative survey of recent trends in the gross national product of Soviet and Western countries, Stanley Cohn does not probe into the question of how estimates of recent Soviet performance would be affected if allowance were made for the well documented exaggeration of agricultural production and growth, indicated in part by Joseph Willett in his paper.

There are grounds for believing that agricultural production in 1960 may have been overstated relative to earlier years by as much as 20 percent, because of false reporting and changes in reporting standards as they apply to such things as moisture content of grain.

Adjusting the estimates of overall growth to eliminate this overstatement would reduce the growth rate for GNP over the last decade around half a percentage point. Estimates of the level of GNP would also be markedly reduced.

In the area of industrial production, Greenslade and Wallace have constructed a new production index for postwar years differing from others constructed by Western scholars in that it covers electronic equipment, merchant ships, and civilian aircraft.

The added coverage causes their index to show a higher rate of growth than the other indexes, which they consider to be less reliable.

Since no output data exist for the added products, Greenslade and Wallace make roundabout estimates based on what seem to be a number of tenuous conjectures. Let me quote, as an example, their description of how they estimated production of electronic equipment:

> The estimates of value of output of electronics used here are based on announced Soviet number and value of electron tubes and semiconductors, which in the United States has been a fairly constant percent of final output. The value of Soviet final output is derived from the U.S. ratio of value of shipments of final output to value of tubes and semiconductors.

One is inclined to agree with the judgment they give in the appendix to their report, that, "Adding imprecise series to an index does not necessarily improve it." Yet they argue differently in the body of the text and accept their higher growth rates as reliable.

Examination of recent trends in Soviet freight traffic, a field unfortunately not surveyed in this year's reports, at least those I have seen, might have led them to be more skeptical.

The increase in freight traffic was only 6 percent in 1960 and 4 percent in 1961, both lower than for any other year since 1928, except 1933 and the war years. One would expect freight traffic to grow faster, not slower, than industrial production in an economy that is expanding spatially, as is the case with the Soviet Union.

A similar leaning toward the high side is seen in the estimate by Greenslade and Wallace of the pace of industrial growth since 1937.

First of all, they make no adjustment for gains from territorial expansion, which accounted for an increase of more than 10 percent in the level of production around 1940. Eliminating these gains would alone reduce the annual growth rate for 1937 through 1961 by about half a percentage point, bringing Greenslade and Wallace's estimate for the Soviet Union down to about the level for Japan and Italy.

Secondly, they argue that their rate is too low, because it does not reflect military production, which, in their view, grew faster than civilian production over this period. To support this view, they examine an index of munitions output for 1940–55 drawn from the works of Abram Bergson and extended backward by them to 1937.

They find munitions output in 1955 to be four times the level of 1937, as contrasted with my own finding of less than three times. Their own finding, they argue, is consistent with known movements in the size of armed forces.

But suppose we move the beginning year forward to 1940 and compare Bergson's findings with mine for the period 1940–55, the only period for which both computations were made.

We then see that munitions output multiplied 1.5 times by Bergson's estimate, and 1.3 times by mine. These figures compare favorably with the multiplication by about 1.5 times in the armed forces that took place between the terminal dates under consideration.

Since civilian industrial production more than doubled between 1940 and 1955, according to either my or Kaplan's indexes, there seems to be little reason to believe that adding military products would raise the growth rate over these years, if either Bergson's or my estimates of military production are taken to be of the right order of magnitude.

Let me briefly mention a third example of the leaning toward overstatement.

I have in mind the paper on machine tools by Anthony Daukas. It may be that the Soviet Union is outproducing the United States in the area of metal-cutting machine tools by a ratio of almost 4 to 1, as Daukas suggests, but many other ratios are also possible, including those that show the United States ahead, depending on how one resolves a large number of unknowns.

It seems to me that Daukas has generally assumed the best situation for the Soviet Union whenever concrete data were not available. The truth is that we do not know the detailed characteristics of Soviet machine tools in the mass. We know only what we read in catalogs or what we see in the specimens of particular plants that are subjected to Western scrutiny. It is as easy to overestimate machine tool production as it was to overestimate missile production. One must particularly be on guard against an unconscious settling of all doubtful matters in favor of the Soviet Union.

However all this might be, an awareness of the uncertainties still remaining in assessment of Soviet economic performance will lead us to be cautious in drawing definite conclusions about how the Soviet economy is performing relative to non-Communist economies.

One gets the impression from the present reports to this committee that the Soviet economy has been growing and will continue to grow faster than such dynamic economies as those within the European Common Market. A slight change in the figures for the Soviet Union, well within the realm of likely error, could produce the opposite conclusion. Under these conditions, it is better to avoid a strong assertion one way or the other.

The conclusion most striking to me from all recent studies is not that the Soviet economy is growing rapidly by current standards, but that the United States economy is growing slowly.

There is a second conclusion as well: the Soviet Union will face some very difficult economic problems over the near future. The pace of growth has been visibly slowing down, the demands of consumers speeding up, and the military and space burden growing.

In his report to this committee, John Hardt has brought an important shortcoming of the Soviet system into focus by pointing out the inability of the economy to adapt itself smoothly to complex changes in demands made upon it. The usual simple measures of the level of production and its rate of growth do not reveal much about this kind of inefficiency.

In some respects, the Soviet economy stands at a crossroads. The events of the next few years may have much to do with determining

the ultimate character of the Soviet economy. Unfortunately, there is no easy substitute for waiting and watching to find out what course matters will take.

Thank you very much.

Representative REUSS. Thank you, Mr. Nutter.

We will now hear from Mr. John Scott, assistant to the publisher of Time magazine.

Mr. Scott.

STATEMENT OF JOHN SCOTT, ASSISTANT TO THE PUBLISHER OF TIME MAGAZINE

Mr. SCOTT. Mr. Chairman, I appreciate being invited to come and speak with this committee.

I found the reports that I read that are bound into this green volume excellent, and would like only to comment in support of the last witness before myself, namely, that several considerations lead me to the conclusion that the rate of deceleration in the Soviet Union's economic growth rate during the past 2 years is probably greater than appears in the documents in the green volume.

I base this in the first place on an alteration in the method used of measuring agricultural production. From the biological yield, which was the criteria used in the 1930's, the Soviet authorities went to the barn yield used later. But now they have gone back to an index half way between the two, namely, the quantity of grain which gets to the hopper of the mechanically drawn combine.

I suspect that this factor may introduce an exaggeration in Soviet statistics for agricultural production. And granted the fact that some third of the U.S.S.R.'s GNP comes from agriculture, I think this would be a significant factor in tending to make foreign experts and observers exaggerate the Soviet Union's rate of growth or underestimate the deceleration which has taken place in the last couple of years.

A second factor that I believe is important is that in planning, the Soviet Union's planners have faced increasing difficulties because of the proliferation of the number of commodities and the different types, colors, sizes, et cetera, of commodities, both in the producer and the consumer field.

This has tended to increase overheads on the part of the administration and planning organizations, and has further complicated the Soviet Union's economic problems.

In view of these circumstances and those mentioned by the previous witnesses and by the prepared documents, I believe that it is unlikely that the Soviet Union's rate of growth will recover from the current deceleration; and the real reason behind it in political terms, it seems to me, is the ossification of political leadership.

The moves undertaken by the Soviet Government and articulated by Mr. Khrushchev since 1957, moves associated with striking off in new directions, like the corn program and the virgin lands program in agriculture, or the administrative reforms of 1958 and those announced several days ago, all beg the major question, and it seems to me unlikely that Mr. Khrushchev at his age and with his type of training will alter his position in this respect.

But on the basis of five visits to the Soviet Union during the past 6 years, during the course of several of which I saw people whom I knew and worked with when I worked in Soviet industry during the 1930's for several years, I believe that there is a second generation of Soviet authorities, of Soviet functionaries, coming up, whose attitude on matters of administration will tend to be very different, more pragmatic, more liberal, if you will, than those of the Khrushchev generation.

I would like to suggest that today there exist the prerequisites in economic terms for fundamental alterations of Soviet attitudes; in the first place in agriculture, and in the second place alterations in the system of accounting and the system of motivation, the motivational chemistry, if you will, of Soviet industry.

To take these one at a time, it was impossible to envisage during the 1930's or 1940's any decollectivization in the Soviet Union without seriously jeopardizing continued party political control.

I believe that today the prerequisites do exist for a measure of decollectivization within the framework of the continued state ownership of land and within the framework of the governmental control of the agriculture, but utilizing credits, the availabilities of fertilizers and machinery, rather than the less efficient, more stifling collective farm system.

I would be inclined to expect that within the next several years, quietly, perhaps, small test tube experiments may be started in individual parts of the Soviet Union, where collective farmers who are known to be of energy and initiative may be allowed to lease pieces of land, whose size would depend on the nature of the crop in the area, who would be given credits from the agriculture bank to procure equipment, machinery, feeds, and fertilizers, and seeds, and who then would be allowed, along the lines suggested by Professor Lieberman of the University of Karkov, to delve into the possibilities of a market Marxist economy.

I am aware of the fact that so far Pravda, although it has published several statements by Professor Lieberman along these lines, has denied that this has any future in the Soviet Union. This to me is unconvincing. When Pravda takes the trouble and the space to publish a series of statements of this kind, it means that they are under serious consideration.

It is my conviction that within a decade, the introduction of this kind of amelioration of the collective farm system might result in an enormous increase in agricultural productivity, in a decrease of that high 47 percent of the Soviet population who today are engaged in agriculture in order to feed the people a diet which, though far better than in China, is still not up to what the people would like or to what the economy could furnish.

I am aware, in saying this, that the limitations in climatic and soil terms on agricultural expansion in the Soviet Union are serious, but the size of its teritory I think makes this not of immediate moment in such considerations.

In the second matter, the area of the utilization of the profit motive in Soviet industrial organizations, rather than the tonnage plans stated by the central planning groups in Moscow, these being suggestions mentioned also by Professor Lieberman—here again it seems to me

that there are the prerequisites today, if Soviet leadership can shake itself loose from the frozen attitudes that are expressed by it today—I think there are opportunities for an increase in efficiency and for the elimination of certain areas that today involve enormous waste in the Soviet Union.

I will mention one, namely, the overinventory of spare parts, not only in Soviet agriculture, but throughout Soviet industry, which results from the fact that the Soviet farms and factories do not have to pay for the use of the capital tied up in their spare parts inventories, therefore tend to overstock, therefore creating circumstances where individual spare parts when needed in an individual farm or factory are not available because they are tied up elsewhere; although the general stocking of spare parts in the Soviet economy is far greater than it is in this country, one has but to read the Soviet press, particularly the technical press, on the eve of a planting or a harvesting campaign, and count the number of complaints about breakdowns and stoppages because of the shortage of spare parts, to realize the seriousness of this consideration.

A second and far different comment which I would like to make is this: As I understand it, the general subject of this discussion is the dimensions of Soviet power. And I would like to make this point: Power does not necessarily depend directly on economic power.

I believe that Soviet economic power is substantial and is certainly growing more rapidly than ours; but the Soviet Union's economy is not the only criterion that one must bear in mind.

And I would like to bring two simple historical problems to bear on this problem.

The Visigoths had no economy at all. This did not prevent them from sacking Rome. Genghis Khan's economy, what we know about it, was an extremely primitive one, and yet Genghis Khan went halfway around the world and took half of Europe.

In both cases, these people had a small disciplined group of men who were mobile and who had good weapons in terms of the technology of that day. In both cases also they faced enemies who were fragmented in political terms, and to one degree or another may have undergone some historic disintegration.

I suggest that the Soviet Union today has an economy strong enough to produce and to maintain an adequate quantity of modern technological weapons, and the disciplined people to man such weapons.

It seems to me, therefore, that in tying our study of Soviet power principally around the Soviet economy, we may be missing a major element in measuring Soviet power.

Thank you.

Representative REUSS. Thank you, Mr. Scott.

Mr. Boggs, have you some questions?

Representative BOGGS. I would like to direct one question to Mr. Scott.

What other factors would you include in this study to measure the total power of the Soviet system?

Mr. SCOTT. The probability of the Soviet Government's controlling the consumer demands of the population sufficiently to channel economic energies into specified areas needed to develop and maintain superior weapons systems.

Now, that is an easy sentence to say. It is very complicated to do it. But I would like to mention in this connection one consideration.

Soviet theory provides for a gradual withering away of the state, and for the evolution of a Communist society based on the principle "From each according to his ability, to each according to his need."

In my recent visits to the Soviet Union, I have tried very hard to find out how they think the needs are to be determined. And it becomes increasingly clear that the party is going to undertake the determination of what the people need.

This means that the party is to be permanently charged with the breakdown, of the disposal of the gross national product of the Soviet Union; and unless popular discontent reaches a point of political danger, which is I think far from in prospect at the present time, it means that they will be able to maintain, although their GNP is only 45 percent of ours, let us say, and may increase to 57 percent of ours—that margin of superiority, or margin of equality, necessary to develop, perfect, and maintain the kind of lead over us which apparently they have today in propulsives in the field of missiles.

This it seems to me is the direction in which such studies might go.

Representative Boggs. They are not based on contraindications, though? The mere fact that they must educate the people to direct these adventures in space and other military technology—does this not increase the demand for consumer goods and luxuries, and so on? Is not that impact of the prosperity of the Common Market having a——

Mr. Scott. I believe, sir, that this is true, and that the Soviet populace today desires more than it is getting. But I think, going back over the last decade, one would find that the per capita consumption of the Soviet populace has been increasing by perhaps 2 percent a year, while the per capita GNP has been increasing by 4 or 5, the GNP in total by, let us say, 6.

In this way, if they can give the people a little more every year than they had the year before, and if they can, through the positive use of the Soviet press, impress the populace with the scientific importance and the glory of being first in various areas like space research, if they can give the people 2 percent a year, and with their present projected GNP increased rates they can do that, and still maintain a comfortable cushion for themselves, I do not think that they are going to have substantial political difficulties with their own population in the foreseeable future.

Representative Boggs. What about populations elsewhere, though? If the GNP of Western Europe continues to increase at a much more rapid pace than the Soviet system, and if the GNP of the United States at least maintains the relative position that it now has, would this not give the Western World, the United States and Western Europe, a great advantage in the so-called underdeveloped areas?

Mr. Scott. Indeed it would, sir. As an appeal in gray areas, the advantage that we stand to receive, particularly the Western European community and Japan, whose rates of growth are equal to or ahead of those of the Soviet Union—this will be a substantial element.

But my observation recently on a long trip through Asia and one in Africa 2 years ago is that the Soviet economy does not hold much

attraction for underdeveloped states in purely economic terms, anyhow.

It is in terms of power, including political power, the power to mobilize the people and make them do the things that you want them to do. This is what impresses people like Secou Touré, or what impressed people like Secou Touré, rather than the affluence that the Soviet population enjoys as a result of communism or socialism at work in that country.

Representative Boggs. Well, I was not referring necessarily to affluence. I was referring more to techniques, to research, to the ability to develop a country, to educate its people, to build its public institutions, its roads, and the things that are required to run a society. And if the West should move ahead, would not this have an ultimate political effect within the Soviet system?

Mr. Scott. Ultimately, yes, sir. But within the next decade, it is hard for me to foresee a circumstance in which the population of the Soviet Union would become politically intractable for these reasons.

And I call to witness the fact that during the past decade the Soviet population has been aware of the fact that people in the West, including the people in the Far East, in Japan, live as well or better than they do. This they know, but they have a series of ready answers to explain it.

Representative Boggs. Is what you are saying—let me understand it—that despite the fact that the Soviet economy is not growing as rapidly as we may have thought it was, or even as rapidly as the impression which we may have gained from the speech of Mr. Dulles some years ago, nevertheless this is no reason for the West to be complacent about the real power of the Soviet Union; is that what you are saying?

Mr. Scott. That is true, sir. This was my whole point, in raising the analogy of the Visigoths and Genghis Khan, in pointing out that even if economic growth is not as great as it might be, the very hunger of the people, and the desire for higher degree, higher level, of standards of living, might increase the danger, rather than decrease it.

Representative Boggs. Would you, Mr. Nutter and Mr. Hunter, agree with that conclusion?

Mr. Nutter. I certainly agree with the fact that the power of the Soviet Union is much greater than its wealth might indicate it should be. Wealth does not imply power. I agree with Mr. Scott on that. Nor does power imply wealth.

I think it is quite true that the way in which the Soviet Union has organized its economy has given it a much stronger posture—to use that military term—in the sense of immediate strength relative to the resources at its disposal than we have accomplished in this country.

I think that the question is extremely complicated, however, as to whether the Soviet Union will be able to maintain this posture indefinitely. I am not so certain as Mr. Scott that they will be able to continue draining as many of their resources into military and space programs as they have.

I think that they have run into difficulties in the last few years, and I consider this one of the basic explanations for the very sharp deceleration in growth in the last 2 years—they have run into difficulties, I believe, in not being able to take the increased resources that

they are putting into the military and space program away from consumption.

They have also had to channel it away from growth. And this leads to some great difficulties, because they have really three competing goals, so to speak: One is the goal of immediate power; the other is the goal of future power; and the third is the goal of a rising standard of living, which I think is a very real goal. And they are having difficulties, I think, in meeting all of these goals simultaneously, and I think they will continue to have difficulties.

But I quite agree with Mr. Scott, and I think it needs to be stressed, that we should not jump from our estimates of the economic strength of the Soviet Union to estimates of their power.

Mr. HUNTER. One thing that should be stressed is that although Western analysts do not come out with the same number for a Soviet rate of growth, the range of their disagreement is rather small. We all agree that the Soviet claims are exaggerated. That really is a terribly important thing; when we disagree among ourselves, the range of our disagreement is relatively small.

What we find difficult is agreeing on a cautious middle ground. It seems to me prudent not to underestimate the U.S.S.R., and I think perhaps I would feel that way a little more strongly than Professor Nutter does.

You cannot be sure of what you are arguing against. It used to be said that the Russians are not 9 feet tall. These papers appear to agree they are certainly not 9 feet tall. On the other hand, they are not just 4 feet tall, either.

Representative BOGGS. That is all, Mr. Chairman. Thank you.

Representative REUSS. I would like to ask a general question of all three members of the panel, and I would like to do it by summing up, as best I can, what seem to be the most salient points to emerge, not only from this panel, but from the whole sweep of the papers that are included in this study.

I will summarize, in terms of four conclusions, at the risk of oversimplifying.

One, it appears that the official U.S. view of Soviet economic growth in the decade of the 1950's tended to be somewhat overstated.

Two, whatever the actual rate of economic growth of the Soviet Union was in the decade of the 1950's, it seems to have slowed down somewhat in this decade of the 1960's.

Three, several of the most important reasons for the slowdown in Soviet economic growth are factors that may be rectified by the Soviet Union, such as dogmatic ideology, inefficient production, and other political influences.

I am thinking particularly of the point made by Mr. Scott, that there may be more pragmatic figures just over the horizon in the Soviet Union who could, by working on some of the difficulties in Soviet agriculture and industrial production and on the social forms behind them, produce another acceleration in the Soviet growth rate.

Four, whatever the projections one might make now as to where the United States, the U.S.S.R., and the Western European countries may be in 1970, the present U.S. growth rate of around 3 percent a year is too slow a growth rate, in view of our national responsibilities for the rest of the decade, at least, in military defense and developmental aid.

I would like anyone's comment on those four points, including violent disagreement, if you do disagree.

From left to right.

Mr. Hunter?

Mr. HUNTER. I agree with all four.

I am not sure that there was very much overstatement, and, in any case, the important thing is that there has been a downward drift. The rate of growth might turn up a little in the next 2 or 3 years, but one could easily guess that the downward drift will continue during the 1960's.

I think that the possibility of correcting the clumsiness is something to be hoped for; and yet, as long as the party is as monolithic as it is, there is no immediate prospect, and it is certainly a touch-and-go matter.

And of course I agree that it would be fine, even if the U.S.S.R. were not there, for us to grow more rapidly, especially since then there might be more we could do for the really low-income countries in the world.

Representative REUSS. Mr. Nutter?

Mr. NUTTER. Well, Congressman Reuss, I think I agree, in general, with your propositions.

Let me skip the first one, because I have already made some statements about that.

Let me consider the question of the slowing down in the growth rate. It is, I think, here, if I may make a remark in response to Mr. Hunter's original statement—I think it is here that our view of the long run is helpful. If we look over the long-run growth pattern in the Soviet Union, we will discover that this slowing down is not something which just suddenly came into the picture in the 1950's. It is a trend that has been in evidence from almost the beginning.

The rate of growth, at least in industry, was faster in the interwar period than it was in the 1950's. The growth in the 1950's was faster in the first half than in the second.

It slowed down very sharply in the last 2 years, and perhaps we should not put too much stress on those 2 years—that is, 1960 and 1961, the last 2 years we have evidence for—because one never knows whether that means very much from the longrun point of view, or whether it is something quite temporary.

But by my calculations, which come out lower than Mr. Greenslade's and Miss Wallace's, the growth of industrial production in 1960 and 1961 was on the order of 5 percent, bringing it down very close to the annual average for the entire Soviet period, which is around 4½ percent.

And I think that if you look at the matter in this light, in the light of the steady tendency for the percentage rate of growth to diminish as an economy matures—and this is typical of almost all economies in the world, everywhere—then it becomes more important to be aware of the long run than one might think.

Now, it is true, I think, that one important reason for the sharp slowdown that we have witnessed in the last couple of years is the inflexibility of the ruling group in the Soviet Union.

I agree with Mr. Scott that there are many signs that this inflexibility may not persist. There is strong pressure from all sides to

do something about it. I think Khrushchev himself is a pragmatic man in many respects. I think he is trying out ideas, and he will go whichever way a sensible politician would tend to go ultimately in making his decisions.

Where perhaps I might not go as far as Mr. Scott is in suggesting that these changes will still make it possible for the ruling group to maintain as complete a grip on the country as they have in the past.

This is just a matter of, I suppose, personal instinct. I find it very difficult to imagine a strong central control over the population in a system that uses the price mechanism to a large extent. Such a system allows for a great deal of decentralized decision making by individual producers and consumers, and there are almost inevitable institutions that arise in that kind of a system making it difficult to maintain a monolithic political structure while decentralizing the economy. But perhaps the Soviet leaders will succeed in doing so.

In any event, I certainly would predict that improvements along this line, and I would call them improvements, will lead to amelioration of the economic problems the Soviet Union now faces, and probably will make it possible for the economy to have higher growth rates than it has had, say, in the last 2 or 3 years.

Incidentally, if one makes allowance for the exaggeration of agricultural production in the last 2 or 3 years, the growth rate of the gross national product is also very low. That is, it would run somewhere between 3 and 4 percent, which is not much higher than ours and about the same as it has been in the Soviet Union over the very long run.

Finally, as to the question of our own growth rate, I think it is slow, as I said. Whether it is too slow—that is a difficult decision to make, because the question is whether we require, for the purposes that the chairman stated, a higher percentage rate of growth to be able to fulfill our responsibilities.

Our 3 percent rate of growth, if our economy is, say, double the size of the Soviet economy, means that we increase our product by at least the same absolute amount each year as they, if they increase at 6 percent a year.

Now, actually, I think our production is significantly more than twice as great as that of the Soviet Union, so that we experience a significantly larger annual absolute increase than they do. But even that may not be relevant.

I think from the point of view of the attitudes of people throughout the world about the effectiveness of the economy in providing higher standards of living, a growth rate higher than we have experienced would be desirable. And in any event, I think it certainly is possible without any great cost to us.

Representative REUSS. Mr. Scott?

Mr. SCOTT. I would like simply to point out that the introduction of a more pragmatic and flexible leadership into the Soviet Union, which might undertake such actions as partial decollectivization or the introduction of a market Marxism would have effect only after several years.

And I would feel that if this does create a corrective for the deceleration of economic growth, this would take place only at the end of this decade, and perhaps later than that.

With reference to our own rate of growth, I think it has to be looked at in two contexts. The first is our own rate of growth in the framework of our own demands. With the population increasing at about 1.6 or 1.7 a year, and with productivity increasing at 2 or 2½ percent a year, an economic growth rate of 3½ percent, let us say, can barely absorb the new people coming into the labor market every year on any level. For purposes of the dynamism of our own economy, we need a higher rate of growth.

But when viewed from the context of the conflict between ourselves and the Soviet Union, in terms of power, here it seems to me that the major element is not our rate of growth. The major element is how much wealth we are able effectively to channel and absorb, in such areas of activity as space research and weaponry of all kinds, and also those key areas where we bring economic wealth to bear in our conflict with the Soviet Union, like military and economic aid in underdeveloped countries.

Representative BOGGS. No further questions.

Representative REUSS. We are very grateful to you three gentlemen for the distinct contribution you have made to our deliberations.

These hearings of the Joint Economic Committee are now concluded, and the committee will stand adjourned.

Thank you very much.

(Whereupon, at 3:45 p.m., the committee was adjourned.)

APPENDIX

THE SOVIET CHALLENGE TO U.S. MACHINE BUILDING

A STUDY IN PRODUCTION AND TECHNOLOGICAL POLICY

BY

MICHAEL BORETSKY

THE SOVIET CHALLENGE TO U.S. MACHINE BUILDING[1]

INTRODUCTION

The challenge

Of the many challenges to the supremacy of the U.S. economy that the Soviets have recently announced in connection with their current (7-year) and prospective (20-year) plans, the first really imminent and apparently most serious challenge is directed toward U.S. machine building. In 1960 the Soviet State Planning Commission (*Gosplan*) stated that by 1965 U.S.S.R. will outstrip the United States not only in the production of those machines considered essential to the growth of the Soviet economy, but also in the volume of all machinery output as well.[2] [3] In 1961 Khrushchev announced to the XXII Congress of the Communist Party that the planned output target for machinery production in 1962–65 had been increased by 16 percent.[4]

It should be noted that the scope of this challenge is substantially greater than the term "machine building" might imply. In addition to what we broadly define as machinery (nonelectrical and electrical), the Soviet term "machine building" also includes all types of transportation equipment, military equipment, and all professional, scientific, and controlling instruments, including such products as photographic and optical goods, watches, clocks, and the like. The challenge thus embraces a huge and the most vital segment of our economy, the sector that constitutes virtually all the economy's base for technological progress in times of peace, the principal mobilization base in case of war, and the origin of more than a third of all U.S. exports. In short, the scope and importance of the challenge is simply overwhelming.

The objectives of this study

This study is an attempt to assess the Soviet challenge with regard to its imminence, the strategy employed to implement the plan, and the likelihood of its success. The four parts of the text and an equal number of appendixes consider the problem.

Part I is devoted to a brief discussion of definitions, the nature of data available, the main features of the methodology employed, and a statement on limitations of the findings.

Part II contains a comprehensive summary of the relative positions of the United States and Soviet machine building industries in 1958. The comparisons are in terms of value of output, employment and productivity, consumption of metals, and technology.

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[1] I am indebted to Paul W. McGann, Jack Alterman, and Stanley H. Cohn for valuable comments and suggestions. Stanley Cohn also criticized an earlier draft.

[2] Bibliographical references in the text of this study are given in abbreviated or code form. Full descriptions of the references will be found at the close of the study, listed alphabetically by code word.

[3] Kratkii Spravochnik, p. 71.

[4] Pravda, Oct. 18, 1961.

Part III is a discussion of the strategy currently employed by the Soviet planners to implement their challenge. The discussion focuses primarily on investment, technological policy and changes in organization of production that have bearing on the subject matter.

Part IV sets forth selected data bearing on the relative developments of the industries in the two countries since 1958 and discusses the likelihood of success as postulated by the Soviets, its cost, and likely implications.

Some of the underlying data on which this study is based are presented directly in the text. But most of them, along with documentation and estimating procedures used in their derivation, are set forth in appendixes A–D.

By way of an introduction I would like to point out that the growth of the Soviet machine building industry has been the subject of penetrating investigation by at least three U.S. economists.[5] However, no such analysis has ever been done for the U.S. counterpart; and a direct comparison of the two industries thus far has been limited to comparisons of selected products, such as machine tools, automobiles, et cetera. This study, therefore, constitutes the first attempt at extensive coverage.[6]

I. Methodology

It is obvious that the scope and complexity of the subject matter considered in this study have presented numerous analytical problems. For convenience, however, I am commenting here only on those matters that are essential for technical understanding and critical evaluation of the findings presented in the text. These include the concept of "machine building" used in this study, differences in product mixes, differences in quality of products, the nature of the data and method of their analysis, and, finally, the limitations of the findings. Consideration of other problems, largely of an estimating nature, is provided at pertinent places in the text and, particularly, in appendixes A and B.

The concept of "machine building" industry used in the study

As noted in the introduction, the Soviet concept of machinery is much broader than our own, both in terms of policy statements and statistical coverage. The difference in meaning of the term, however, does not represent a serious roadblock in the analysis because U.S. statistics are available in sufficient detail to permit construction of an aggregate comparable to the Soviet concept.

Hence, on grounds of statistical expediency, the overall comparison of all machinery production and its major aspects is made in terms of the relatively small scope of such activity in U.S.S.R., and because of the Soviet aggregate concept of machine building industry. The

[5] Machine building appears to have been analyzed to varying extents in all the numerous studies on Soviet industrial growth. The three studies referred to here are by Gershenkron, Hodgman, and Moorsteen. They deal with machine building either exclusively or extensively. Moorsteen's study is virtually an up-to-date account of the developments. See Gershenkron, Hodgman, and Moorsteen.

[6] During the terminal phase of this study, in American Economic Review, September 1962, Alexander Tarn and R. W. Campbell published their comparison of Soviet industrial production relative to the United States in 1955 and 1960. A substantial part of their study is devoted to a comparison of "engineering" industries; meaning machinery industries and metal fabrication. For 1960, the authors, employing highly intuitive methods of analysis, concluded that Soviet output of machinery and metal fabrications (engineering goods) was 98 to 109 percent of that in the United States. Though I have not been able to analyze the output of the two sectors in great detail, the pertinent direct data at my disposal suggest that the Tarn-Campbell "estimate" overstates the relative magnitude of Soviet production of "engineering" goods in 1960 by as much as one-half to two-thirds.

concept roughly corresponds to the following U.S. Bureau of the Budget's Standard Industrial Classification (SIC) groupings:[7]

SIC 35 (machinery, except electrical);
SIC 36 (electrical machinery, equipment and supplies);
SIC 37 (transportation equipment);
SIC 38 (professional, scientific and controlling instruments, photographic and optical goods, watches and clocks);
Those portions of SIC 33 (primary metals) and SIC 34 (fabricated metal products) that manufacture rough or semifinished *machinery* parts, such as castings, forgings, weldments, etc., and such equipment as boilers, heating equipment, etc.; and
Those portions of SIC 19 (ordnance and accessories) that manufacture military equipment.

In addition, the Soviet concept of machine building includes establishments specializing in machinery repair for which there is no separate U.S. statistical manufacturing category. The noncomparability of the findings resulting from noninclusion of specialized machinery repair activity in the United States, however, is insignificant because of the relatively small scope of such activity in U.S.S.R., and, because of the inclusion of most of this activity in the United States in the aggregate production of establishments manufacturing both original products and the bulk of replacement parts.

Differences in product mix

Though, given appropriate data, a meaningful comparison of the two aggregate industries might be constructed without regard to the differences in product mix, for the purposes of this study such information is of utmost importance.

Despite rather severe data limitations for U.S.S.R., the machine building industry has been disaggregated into 11 major industry sectors, as follows:

Automotive industry.
Other transportation equipment, except aircraft.
Agricultural equipment, including tractors.
Mining, metallurgical, and petroleum equipment.
Steam engines and turbine-generators.
Electrical machinery.
Construction and material handling equipment.
Metal-cutting machine tools.
Printing trade machinery.
Internal combustion engines.
Other machinery industries.

In terms of product composition these sectors appear to be as comparable as one may hope to make them. In both countries they represent specific machinery industries with identical definitions as manufactures of similar final products, products requiring similar material inputs, or products requiring similar production methods.[8]

Comparisons of these industry sectors bring out the marked dissimilarity of the two countries' industrial structures, and the differential levels of productivity and general technological advancement in

[7] Cf. Volodarskii, pp. 267–275; Eliashevich, pp. 50–54; and Standard Industrial Classification, 1957 ed., pp. 96–117.
[8] Cf. Omarovskii, pp. 78–79, and Standard Industrial Classification, p. 431.

various Soviet machinery sectors relative to the United States. They are also very helpful in isolating basic elements of Soviet technological policy.

Differences in quality of products

The problem of quality differences is closely related to that of product composition.

In a broad technical sense, a qualitatively superior machine is defined as the one that, other things being equal, is more productive, more versatile, more accurate or requires less maintenance, or any combination of the foregoing attributes.

The criteria used by Soviet engineers in comparing U.S.S.R. and United States made machinery, leads to the conclusion that on a whole the United States machines are superior to their Soviet counterparts. The opinion of the United States engineers familiar with Soviet machinery seems to be very much the same. The probable exceptions, notably missile launching installations, some remote control instruments, continuous casting machines, electroslag welding machines, and, perhaps a few more, are presumably too few to affect the overall average significantly.

All the indices presented in the study have been derived with due consideration of the respective actual or probable value parameters. Hence, the indices do take into account the quality differences between Soviet and United States machinery production provided that such differentials require input expenditures in production and therefore are reflected in the data on the respective value of outputs as well as in the dollar/ruble conversion ratios. As far as practicable, the adequacy of the dollar/ruble ratios used has been ascertained and the results corrected for quality differences when found appropriate. (See app. B, sec. I.)

Needless to say, this procedure takes care of most of the problem, but not all. For example, it is hardly possible to believe that the notorious breakdown rates of Soviet agricultural machinery are reflected in their prices; hence, no account is taken of this fact. One way to correct this would be to adjust the indices arbitrarily by a percentage point or two. If so, then what about the question, Would it cost us less to produce machinery with greater rates of breakdowns? In other words, the procedure is as much as one can do with the available data. It is necessarily incomplete, but it is doubtful that the errors are significant.

The nature and sources of data

Despite a gradual improvement in the availability of Soviet statistical information that has taken place since about 1956, the official statistics on the machine building industry are still, as for most other sectors, highly selective, if not outright inadequate for any comprehensive analytical work. However, the tremendous preoccupation with growth, technology,[9] and productivity in the production of machinery has resulted in piecemeal publication of substantial amounts of detailed technological data. Most of them have appeared in technical sources, both periodical and reference handbooks, but quite a

[9] In a general sense by the term "technology" I mean methods of processing raw materials into semifabricates and/or final products. For alternative definitions, however, see below.

few have also been obtained in economic journals and even newspapers. The availability of these detailed technological data, particularly in the last 5 or 6 years, has made this study possible.

The information for the U.S. industry comes predominantly from the Census of Manufactures and/or related annual publications of the Bureau of the Census. However, the contributions of numerous trade journals and other non-Government sources have not been insignificant. Few usable data could be obtained from purely technical sources.

At this point, a brief note on two observations regarding accessibility of information on technology and quality of statistical data pertinent to the subject matter should be of interest.

The first is that, as far as my research experience indicates, the amount of information on technology in machine building in general, and on technological innovations in particular,[10] presently available in readily accessible Soviet sources by far exceeds the same type of information in readily accessible U.S. sources. I suspect that this may be a reflection of the difference in speeds of communication between competitive structure of the United States industry and the centrally administered Soviet system.[11]

The second observation is that, at least with regard to the statistical data used in this study, the U.S. data on a whole appear to be qualitatively superior to those of the U.S.S.R. As noted, most of U.S. data are derivable from the Census of Manufactures, whereas most of the Soviet data appear to be the results of ad hoc investigations, that is, at best, they are sample estimates.

Method of analysis

The method adopted to analyze these data is a rather complex combination of aggregate and process analyses.[12] The essence of the method is that in addition to an aggregated view of the industry, or some part of it, the industry is also analyzed as a set of component processes. A process is defined as an activity that yields an intermediate product or service, or puts the intermediate products and services into finished machines. Each process or service is composed of a combination of inputs—labor, materials, and capital.

Specifically, the aggregative method was sufficient to determine employment, one version of value of output, and the overall productivity of Soviet machine building in 1958 relative to the United

[10] Technological innovations are defined as measures that, as compared with methods used at the time, result in production of the same product with less resources or more products with the same amount of resources; in production of better products with the same amount of resources; or in production of products that was impossible to produce before. Technological innovations might be introduced in the form of new equipment, improvements in existing equipment, introduction of new manufacturing processes or improvements in existing ones, or introduction of new materials and/or improvements in existing materials.

[11] The conditions in machine building are probably not unique in this regard. Other industry sources with which I am more or less adequately familiar suggest that very much the same situation prevails also in steel industry.

[12] As far as I could establish, "process analysis" was first suggested by Leontieff and his colleagues (see Loentieff, passim, but particularly pt. IV, "Explorations in the Use of Technological Data") and Markowitz (see Markowitz, passim). Markowitz, p. 1, refers to "process analysis" as "representation of an economy, or some part of it, by a mathematical model which reflects the production processes available to it, and which is designed to yield estimates of its capabilities and limitations." Empirical feasibility of this method was first extensively tested in a series of studies of Soviet machine-building industry by the University of North Carolina research team under the direction of Daniel Gallik and James H. Blackman in 1955–60. (See "Soviet Planning Studies," Nos. 5, 6, and 7.) The present study constitutes the first attempt to apply the method also for international comparisons.

States. The technological data analyzed by means of process analysis, however, also permitted determination of metal consumption, another version of value of output, the pattern of process use (hence, technology), and the main features of technological policy pursued by Soviet planners in the field of machine building. In addition, the correlation of the metal consumption and value of output data arrived at independently by means of the two approaches permitted rough delineation of the main structural characteristics of the Soviet machine building relative to the United States, a finding of utmost analytical and political interest. Process analysis was also instrumental in estimating the probable growth of the Soviet industry between 1958 and 1961. In short, the combination method permitted a much wider and deeper analysis than could have been achieved by using either of the two approaches alone.

Table 1 presents a fairly comprehensive list of the processes and services commonly used in machinery production in the United States and the U.S.S.R. This list constitutes the basic framework for the analysis of the technological data. For the convenience of readers not familiar with the technologies of machine building, the list also contains brief descriptions of the functions these processes and services perform.

TABLE 1.—*Major processes and services commonly used in machinery production*

Process or service	Function
Casting	Making parts by pouring hot metal into specially prepared molds.
Forging	Making parts by heating mill-shaped metal pieces up to elastic state and subsequent forming to desired configuration by means of metal-forming machines.
Stamping	Making parts from cold sheet metal by means of metal-forming machines.
Metal fabrication	Making parts of desired configuration by welding or riveting two or more mill-shaped metal pieces.
Electric wire insulation and winding.	Manufacturing of subassemblies for electric machinery.
Metal coating	Covering parts with a lyer of other metal by chemical or electrochemical processes for protective or decorative purposes.
Heat treatment	Hardening, tempering, aging, or imparting some other desired properties to parts by certain heating-cooling procedures.
Machining	Finishing prefabricated rough parts (castings, forging, etc.) to desired shape and accuracy by cutting off the excess metal (chips) with metal-cutting machine tools.
Assembly	Assembly of finished parts into subassemblies and/or finished products (machines).
Tool and die making	Making cutting tools, jigs, fixtures, and dies for use with metal-working machines.
Patternmaking	Making wooden, metal, or plastic replicas for use in molding of castings.
Maintenance of plant and equipment.	As defined.
Quality control	Do.
Material handling	Do.
Storage	Do.
Technical services	Technical supervision and product and technology development.
Administrative and sales services.	Provision of orderly flow of inputs and disposition of output.

Sources: Engineering handbooks.

Basic premises of process analysis

For purposes of a critical evaluation of the numerous estimates and other propositions presented in the study, and particularly the ones regarding Soviet technology and technological policy, the following major premises employed in the analysis should be noted: [13]

(1) The general definition of technology of machine building as methods used for processing raw materials into semifabricates and/or final products given earlier might also be stated as the pattern (proportional relationship) in which the processes and services, listed in table 1, are used in the production of machinery. Since in ultimate analysis these processes are combinations of inputs, i.e., labor, materials, and capital, however, technology might also be defined in terms of these inputs, that is, as input/output ratios. The advantage of the process-inputs definition is that, given necessary data, it permits a quantitative analysis of the subject matter.

(2) The pattern of process use in production of machinery depends mainly on the type of machine, its weight, scale of production, availability of resources and, as in case of the U.S.S.R., noneconomic considerations.

(3) Some types of machines, depending largely on structural characteristics of the component parts, require virtually all the processes, but some only few. At least some assembly and machining are the only two processes that appear to be used in production of all types of machines. Also there are presumably few types of machines the production of which would not use castings. The use of other processes varies much more widely.

(4) Other things being equal, one set of processes might be used when a given type of machine to be produced is small, and another set when the machine is substantially larger. The principal factors affecting the pattern of process use depending on size of machines produced are limitations of available equipment.

(5) Other things being equal, one set of processes might be used when the machines are produced in units or small lots and another set when produced in mass quantities. The substitution of processes, and/or changes in their relative proportions is apparently caused by differential changes in economies of increasing scale or diseconomies of decreasing scale that accompany the use of individual processes at varying scales of production.

(6) The variability of technology with scale of production, however, is not continuous, but highly discreet. That is, a switch to a different set of processes or different proportions is undertaken only when substantial change in scale in production is underway. As a result of such practices, the whole range of technologies used in machine building might be described in terms of only a few typical settings. Of these, according to industrial engineers and equipment manufacturers, the most typical conditions are as follows: (*a*) custom-type production (used in, e.g., plants producing rolling mill equip-

[13] The premises, representing a concise general outline of factors affecting choices of technology in machinery production, have been formulated in the course of about 7-year-long research in the subject matter as practiced in Soviet and United States industries, mostly in association with the University of North Carolina research team referred to above and the Division of Productivity and Technological Change, U.S. Bureau of Labor Statistics. For greater detail on Soviet practices see "Soviet Planning Study," No. 5, passim, but particularly chs. I, II, and IV; Nos. 6 and 7, ch. I, and summary tables. The case studies bearing on the subject matter in the U.S. industry are yet to be published.

ment, heavy turbines and generators, oil processing equipment, etc.); (*b*) "batch" type production (used typically in plants producing, e.g., metalcutting machine tools, polygraphic machinery, construction machinery, etc.); (*c*) mass production (used in plants producing, e.g., automobiles, electrical appliances, small electrical motors, etc.).

(7) In general, a plant, or industry, is likely to use one set of processes in production of a given machine when certain inputs are unavailable or scarce, and another set when they become abundant. In numerous cases, however, the availability of certain processes constitutes limiting factor of production.

(8) Except for oversize products, there are no technologically induced rigidities with regard to the organization or location of the processes used in the production of machinery except for assembly process. Hence, in the international comparisons, the actual organizational patterns can be interpreted fairly accurately in terms of economic and political criteria only.

(9) Inputwise there are as vast differences between different processes as among the processes of a kind.

(10) As a result of differential technological development in machine building to date, however, some of the processes tend to be relatively labor intensive irrespective of application, and some capital intensive. Of the most important processes, casting, pattern making, tool and die making, and assembly are notably labor intensive; stamping, machining, and forging are inherently capital intensive.

(11) Of the basic part prefabricating processes, the products of casting, free (open die) forging, and riveting consume relatively more metal per part than those of stamping, (closed) die forging and welding, respectively.

(12) The principal factors affecting the differences in input combinations of the processes used in the production of a given type of machine are, the size of machine, resource availability, scale of production and, as in the U.S.S.R., noneconomic considerations. Other things being equal—

(*a*) The heavier the machine to be produced the more labor intensive the processes used are likely to be;

(*b*) The richer the economy, the more capital intensive the processes are;

(*c*) At least in presently prevailing practices in the two countries, the larger the scale of production in which the processes are used the more capital intensive they become. The substitution of capital for labor with increasing scales of production is usually accompanied also by savings of materials, particularly metal. The substitution takes the form of increased capital/labor ratios, as in, e.g., substitution of mechanical material handling for manual material handling, and/or changes in kind of capital, e.g., substitution of automatic machine tools for universal type, etc.

(13) At any given time, the capacity of the industry, or some part of it, is entirely dependent on the capacity of the component processes. An increase in the capacity might be effected only through expansion of the processes and/or technological progress. In this context, the latter is defined as the sum of decrements in resource requirements per unit of output resulting from technological innovations.

(14) The processes and services defined in table 1 are assumed to be the only channels of technological innovations and, hence, of technological progress. Studying the use of the processes over time permits a quantitative evaluation of technological progress and its sources, shifts in resource requirements, delineation of basic features of technological policy and the like.

(15) Industrywide technological progress is a rather slow process. As a result, the overall input/output ratios at two not too distant points in time cannot differ much. An application of technological ratios to estimates for somewhat different points in time than to which they actually pertain, therefore, does not result in grossly erroneous propositions.

(16) Since technology of machine building is to a large extent dependent on the product mix of the industry, the international comparisons of industrywide technologies can be interpreted only as rough approximations of general pattern of resource use unless the respective product mixes are similar. On the other hand, the comparisons of technologies used in specific industries, that is, industries producing like types of machines, could be fully meaningful only if proper account is taken of substantial differences in scales of production and differences in organization of production (processes).

Limitations of the findings

Despite my attempts to do as thorough a job as possible, the reader is most emphatically warned that the estimates and conclusions presented are only approximations, or probabilities, rather than in any sense accurate measures. This is due to numerous factors, but mainly to the inadequacy of some of the data used, both Soviet and United States, and the complexity of the subject matter. However, I do believe that even as approximations they have the merit of illuminating this important and unexplored area of inquiry. They also point out the great potentiality of the hitherto little used technical sources of information as being exceedingly promising not only for similar studies of other industries, but also for other areas of economic research as well.

II. The Status of Soviet Machine-Building Industry Relative to United States in 1958

In this part I set forth the findings which reflect on the status of Soviet machinery production relative to the United States in 1958. The comparisons are in terms of total value of output, product mixes, employment and industrywide productivity, consumption of basic metals, technology and productivity in five selected sectors. In an attempt to make the presentation of data as concise and as simple as possible, the text includes only the final results of the comparisons. The underlying data, documentation and exposition of estimating procedures have been deleted to appendixes A and B.

Most of the data contained in this part serve as benchmark information for the analysis carried on in parts III and IV.

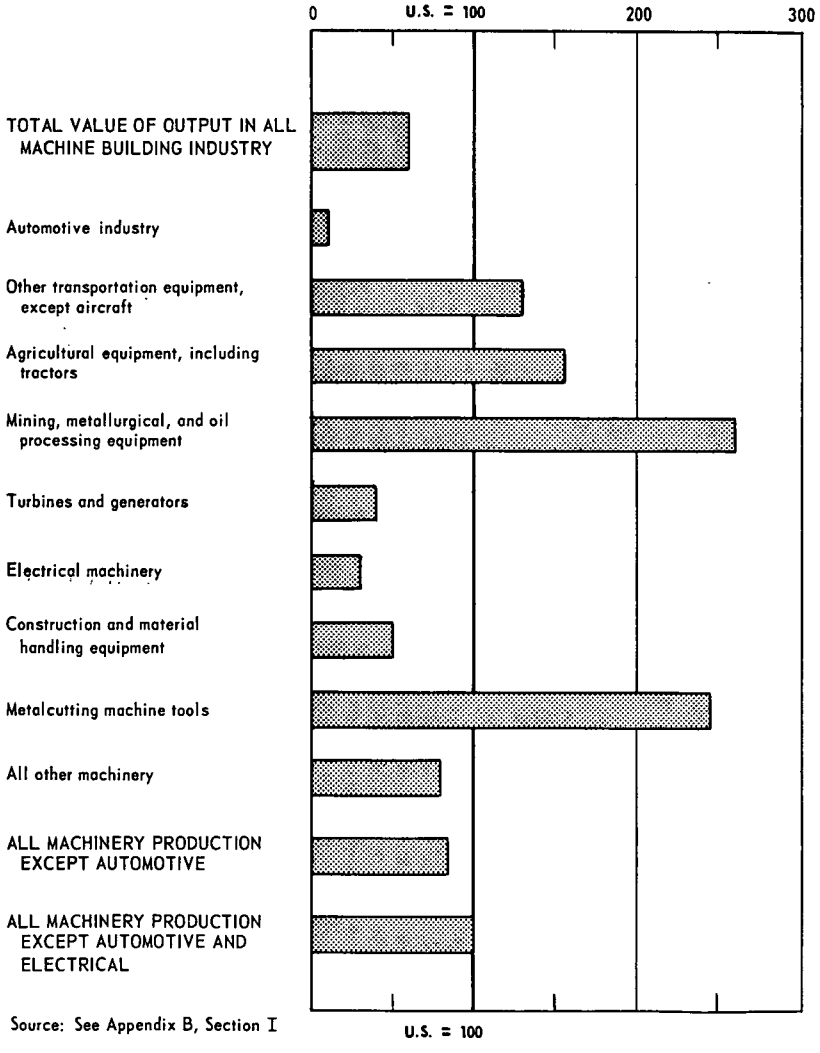
Total value of output

The best estimate that can be made from the presently available data is that in 1958 the net value of all Soviet machinery produced,

as defined by their concept of machine building was about $44.7 billion compared with roughly $74.4 billion in the United States. In percentage terms the Soviet output was thus about 60 percent of the United States (fig. 1). By net value of output is meant here final product, or value added plus unduplicated cost of raw materials, fuels, and electric energy consumed in production.

Fig. 1

PROBABLE VALUE OF OUTPUT OF SOVIET MACHINE BUILDING INDUSTRY RELATIVE TO U.S., 1958



Source: See Appendix B, Section I

In terms of this finding the challenge means, then, that the Soviets plan to increase their machinery production between 1958 and 1965 by $30 billion plus whatever the United States industry might gain over the period.

Though very informative, this finding does not provide clues on the nature of Soviet lag in machinery production which is of utmost importance for the objectives of this study. For such information it is necessary to examine the product mix structure of the two industries.

Product mix

The difference in the overall magnitudes of the output is matched by even greater differences in its composition. (See fig. 1.)

Though the total value of output of Soviet machine-building industry constituted as much as three-fifths of ours, they produced only about one-tenth of our output of automotive products, less than one-third of the value of electrical machinery, only two-fifths of the value of electrical generating equipment, and only half of our output of construction and material handling equipment. In contrast, however, they did exceed us in the production of railroad equipment and, perhaps, shipbuilding (the two products constitute the bulk of "other transportation equipment, except aircraft") by some 30 percent; mining, metallurgical and oil-processing equipment by 160 percent; metal-cutting machine tools by 145 percent; and, suprisingly, agricultural equipment, including tractors, by about 55 percent.

In assessing these product mix data in regard to the postulated challenge, we should note the following:

(1) The bulk of the 67-percent excess of United States machinery output over that of the U.S.S.R. is probably accounted for by consumer durables, particularly automobiles and electrical appliances. The latter constitute a substantial part of electrical machinery production. If the production of automotive industries is excluded from the comparison, the ratio of Soviet machinery output relative to the United States increases from 60 to 85 percent; if both, the production of automotive and electrical machinery are excluded from the comparison, the ratio of Soviet machinery output to the United States reaches parity.

(2) Since in 1958 about one-third of the U.S. output of automotive industry and about half of electrical machinery were capital goods, the United States apparently exceeded the Soviet industry in production of both, consumer and producers' durables. The Soviet gap in the production of capital goods, however, was presumably only about 10 to 15 percent.

(3) Apart from smaller Soviet output of producers' durables relative to the United States, their mix was also substantially different. Whereas the U.S. output was apparently geared to the technologically balanced demand of the whole economy, the Soviet output was tailored largely to the expansion of basic technological processes of priority industries. The relative leads in production of metal-cutting machine tools, mining, metallurgical and oil processing equipment, on the one hand, and the lag in production of electrical machinery, construction, and, particularly, material handling equipment on the other, are lucid illustrations to the point. Therefore, as a base of technological progress, at least in the sense of a balanced concept, the Soviet machine building industry was far behind that of the United States.

(4) The data apparently include both civilian and military equipment, the latter to the extent that such equipment may be termed "machinery" rather than "metal fabricates." Though the military equipment cannot be delineated into a separate category in either industry, it might be safely presumed that in both cases most of such equipment, including aircraft and missiles, is hidden in the residual sector of "all other machinery." In 1958, the value of Soviet output in this sector is estimated to have been about 80 percent of that in the United States. However, since the share of strictly civilian products in the category of "all other machinery" is likely to have been relatively smaller in the U.S.S.R. than in the United States, it might be presumed that the production of Soviet military equipment was greater than 80 percent, if not on par with the United States.

(5) Despite the probable closeness in production of military hardware and capital goods, as a mobilization base in case of war (meaning, of course, conventional or semiconventional) the Soviet industry in 1958 must be assessed to have been behind the United States by more than in all production, most probably at about 50-percent level only. The reason for this is that the production facilities manufacturing such mass demand products as automobiles, small electrical machinery, and household appliances in which the United States greatly exceeded the U.S.S.R. can be much more readily converted to production of military goods and after such conversion would be much more efficient than the facilities manufacturing rolling mills or mining equipment in which the Soviets exceed the United States.

Most of the data, except for agricultural equipment, are consistent with what has been generally known about the direction of Soviet industrial development. However rough they might be, the data substantially reinforce previously held notions by providing quantitative dimensions. The surprising magnitude of Soviet production of agricultural equipment relative to the United States obviously suggests that the solution of the U.S.S.R. troubles with agriculture might require much more profound measures than a greater volume of investment.

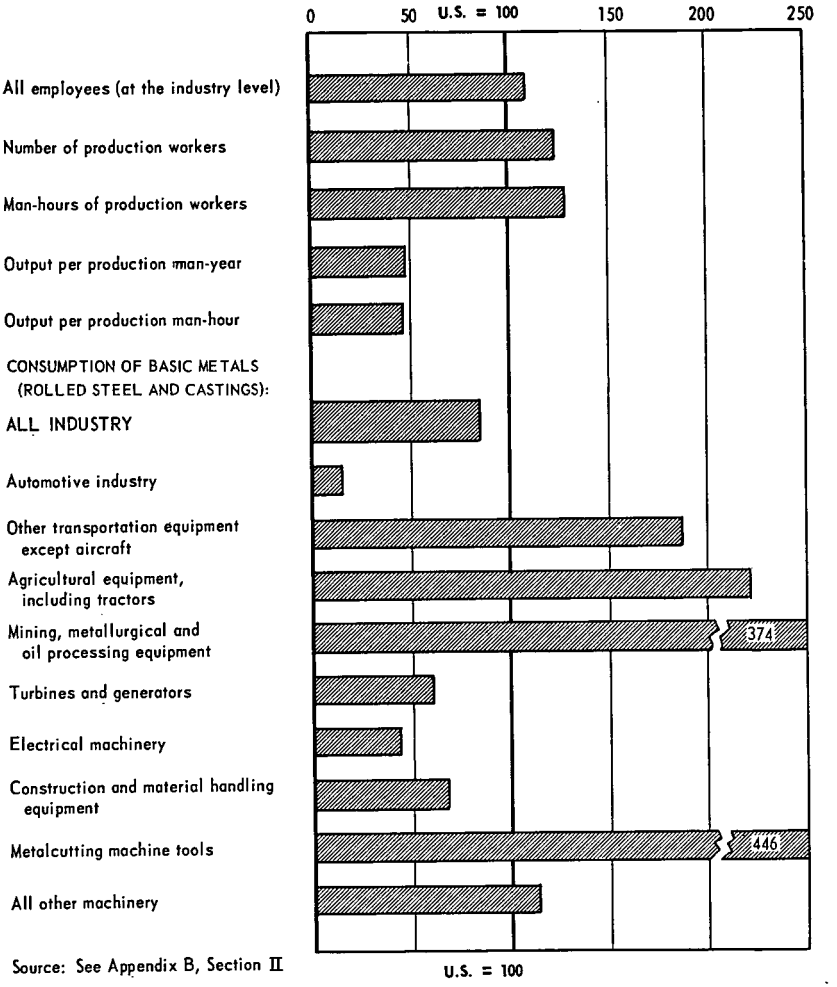
Employment and the industrywide productivity of labor

Though the total value of output of Soviet machine-building industry in 1958 constituted only about 60 percent of that in the United States, its "all employees" category of roughly 5.6 million exceeded ours by 9 percent; the employment of production workers alone, amounting to 4.5 million, was larger than ours by 24 percent; and the number of man-hours worked by production workers was larger by 28 percent. (See fig. 2 and app. A, table A–1.)

Obviously, of the three comparisons, the one that most completely reflects the relative expenditures of labor in Soviet and United States machine-building industries is that of man-hours worked by production labor. This comparison shows that in 1958 the Soviets used 28 percent more labor inputs in machinery production than did the United States.

The comparison, based upon the number of production workers, deviates from that derived from man-hours because of the longer Soviet workweek. The Soviet expenditure of production labor for manufacture of machinery in terms of this comparison was only 24

Fig. 2
EMPLOYMENT, PRODUCTIVITY, AND CONSUMPTION OF BASIC METALS IN SOVIET MACHINE BUILDING INDUSTRY RELATIVE TO U.S., 1958



Source: See Appendix B, Section II

percent larger than that in the United States. We should note, however, that the difference between the two comparisons is negligible, only slightly more than 3 percent.

The index derived from the comparison of "all employees," however, indicates the excess of employment in the Soviet industry relative to the United States of only 9 percent. Should we take it at face value and compare this relative with that pertaining to production workers, we would have to conclude that the Soviets operate their machine building industry with substantially fewer nonproduction workers and, hence, in this respect more efficiently than we do. How-

ever, such inference is not warranted because the apparent conceptual similarity of the underlying data must be qualified by institutional differences.

The concept of "all employees" by industry presumes to include everybody who works for the respective industry, but does so only at the establishments, or operational level. Hence, of the true total manpower working for the machine-building industry, the U.S. statistics exclude those employees that man the central administrative offices and auxiliary activities (research laboratories, storage warehouses, powerplants, garages, repair shops, etc.), while the Soviet statistics exclude, at least, the sales, purchasing, planning, and technical personnel that work for the industry but formally are attached to the centralized organizations with an independent administrative status outside the industry.

Unfortunately, no statistics are available on this "outside" industry personnel for the U.S.S.R. From the numerous qualitative statements on the subject matter in the Soviet press we might presume, however, that its size relative to the "operational" employment is substantially larger than the approximate 5 percent in the United States.[14] Although with presently available data there is no way to determine how much more, we may presume that the ratio of all "nonproduction" employees to production workers in the Soviet industry is at least somewhat higher than the employment data at the operational level suggest.

The reason I am presenting these data is that despite the stated deficiencies they give a closest approximation of the relative total magnitudes involved that could be obtained.

It follows, then, that in 1958 the industrywide productivity of Soviet labor in machine building was about 47 percent of that in the United States, as derived from production labor man-hours worked. In view of the small quantitative discrepancy between man-hours worked and man-years we might use also the index derived from man-years; that is, 48 percent. On grounds of likely misinterpretation it might cause, however, it does not seem appropriate to calculate the productivity index from the data on "all employees."

Consumption of basic metals

In addition to the comparison of employment in the two industries, figure 2 also presents comparisons of basic metal consumption. The basic metal consumption data are presented for both total industries, and by the defined sectors. As defined here, the term "basic metals" includes all types of rolled steel; that is, all steel mill shapes and forms used for forgings, stampings, fabricating of parts by means of welding or riveting, and rolled steel stock used for directly machined parts; and all types of castings—gray iron, malleable iron, steel, and nonferrous. Hence, these metals constitute approximately 90 to 95 percent of all metals used in the production of machinery in the two industries. The data on the remaining 5 to 10 percent, largely nonferrous rolled stock and "exotics," are too spotty to permit a systematic analysis.

It will be noted that, as with labor inputs, the Soviet machine-building industry as a whole is using basic metals much more liberally than do comparable U.S. industries. The total output of Soviet machinery-building industries valued at 60 percent of the U.S. total required only

[14] Cf. Census of Manufactures, 1958, vol. I, pp. 1–4 and 1–5.

15 percent less basic metals than the U.S. output. In other words, to produce a dollar's worth of machinery, Soviet industry must expend approximately 40 percent more metal than our own industry. Similar conditions also prevail in individual sectors. The principal reasons for this significant disparity include: differences in product mix, unit sizes, unit complexity, and, above all, differences in technology.

Since the available data do not permit much of a discussion about the factors affecting metal consumption other than technology and differences in unit sizes, I defer further discussion of the subject matter until the subsequent section.

Technology and productivity by sectors

The differences in the technology used in Soviet machine building industry relative to the United States have already been alluded to in the references to the Soviet's liberal use of manpower and basic metals per unit of value of output. The readers who have inspected the underlying data for the preceding comparison of the basic metals consumption (app. A, table A–2) must have also noted the vast differences in the proportions of castings in the total tonnages of basic metals used in the two industries as a whole as well as in sector by sector.

To inquire systematically into the nature and magnitude of these differences I have made the following detailed comparisons:

(*a*) A comparison of *all labor* inputs by major functional groups per unit of output in the machine building industry as a whole.

(*b*) A comparison of *production labor* inputs by major technological processes per unit of output in five selected sectors of machine building.

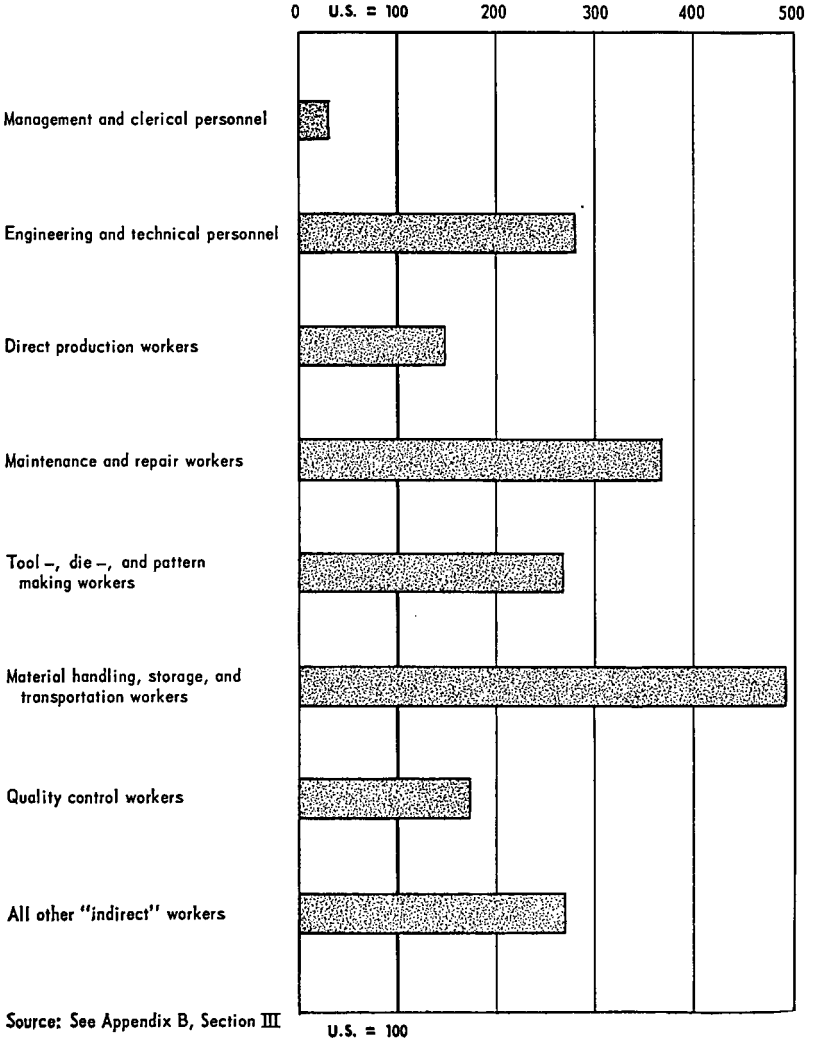
(*c*) A comparison of tonnage inputs of basic metal prefabricates per unit of output in the five sectors of machine-building industry.

It should be noted that the comparisons of (*a*)and (*b*) employ different classifications of manpower. The "functional" groups in (*a*) pertain to the described general type of work performed by workers irrespective of the processes as defined in part I, table 1. The principal term "direct labor" refers to workers that directly engage in the processing of raw materials into semifabricates and/or finished product. Other functional groups of labor participate in this activity only *indirectly*. The breakdown in comparison (*b*), however, pertains to the processes as defined in part I. A note also should be made of the fact that comparison (*a*) is derived from the data on "all employees (at the industry level)" and is subject to the limitation as set forth in the discussion of employment, whereas comparison (*b*) is in terms of "production labor" only.

The five sectors selected for the comparisons (*b*) and (*c*) are: steam engines and turbogenerators, manufacture of metal-cutting machine tools, manufacture of printing trade machinery, manufacture of internal combustion engines, and automotive industries. These sectors are believed to have common product mixes and relatively similar scales of production. The two samples are considered to be representative cross sections of the respective industries with regard to the conditions in the three typical technological "scale" settings (custom-type, "batch"-type, and mass production), as well as, for U.S.S.R., reflective of the relative impact of high priority enjoyed by certain sectors.

The results of these comparisons are presented, respectively, in figures 3, 4, and 5. Since most of the results are self-explanatory, I will comment here only on a few general points that should prove useful in a later discussion about the technological policy currently in use.

Fig. 3
LABOR INPUTS OF ALL EMPLOYEES
IN SOVIET MACHINE BUILDING INDUSTRY
BY MAJOR FUNCTIONAL GROUPS
PER AVERAGE DOLLAR'S WORTH OF MACHINERY PRODUCTION
RELATIVE TO U.S.,
1958



Source: See Appendix B, Section III

(1) The most striking feature of Soviet technology in machine building relative to the United States is that it is heavily labor oriented. It will be recalled from the earlier discussion that in 1958, a dollar's worth of machinery output in the Soviet industry required 110 or 113 percent more labor than in the United States industry. The measure depends on whether it is derived from, respectively, relative numbers of production workers, or production labor man-hours worked. (See fig. 2.)

(2) Equally interesting are the relative variations in the extent of "labor intensity" in individual sectors. As shown in figure 4, a dollar's worth of Soviet output of steam engines and turbogenerators required about 110 percent more production labor than in the United States; that of metal-cutting machine tools only about 60 percent more; printing trade machinery about 100 percent more; internal combustion engines 95 percent more; but a dollar's worth of Soviet output in automotive industry required 2.7 times as much production labor as in ours. Hence, the excess in labor inputs per dollar's worth of output in the Soviet industry was smallest in the manufacture of metal-cutting machine tools and the largest in the automotive industry. The excess in the three remaining sectors was identical or very close to the average for the whole industry. The most favorable productivity ratio in manufacture of metal-cutting machine tools, however, was not accidental. Since the beginning of the Soviet industrialization, machine tool building has enjoyed one of the "top" priorities in the whole industry.

If the technologically representative nature of these observations be accepted, it is also possible to draw similar conclusions for the respective "scale" segments and/or other "top priority" sectors of the Soviet industry. The labor productivity in the Soviet machine-building industry in 1958 was probably:

(*a*) At about a third of the U.S. level in mass production sectors (automotive industry, manufacture of agricultural equipment, small electrical machinery, household appliances);

(*b*) At about 40 to 45 percent level in custom-type production sectors (rolling mill equipment, oil processing equipment, heavy construction machinery, etc., except for manufacture of turbines and generators for which the estimate is 50 percent);[15]

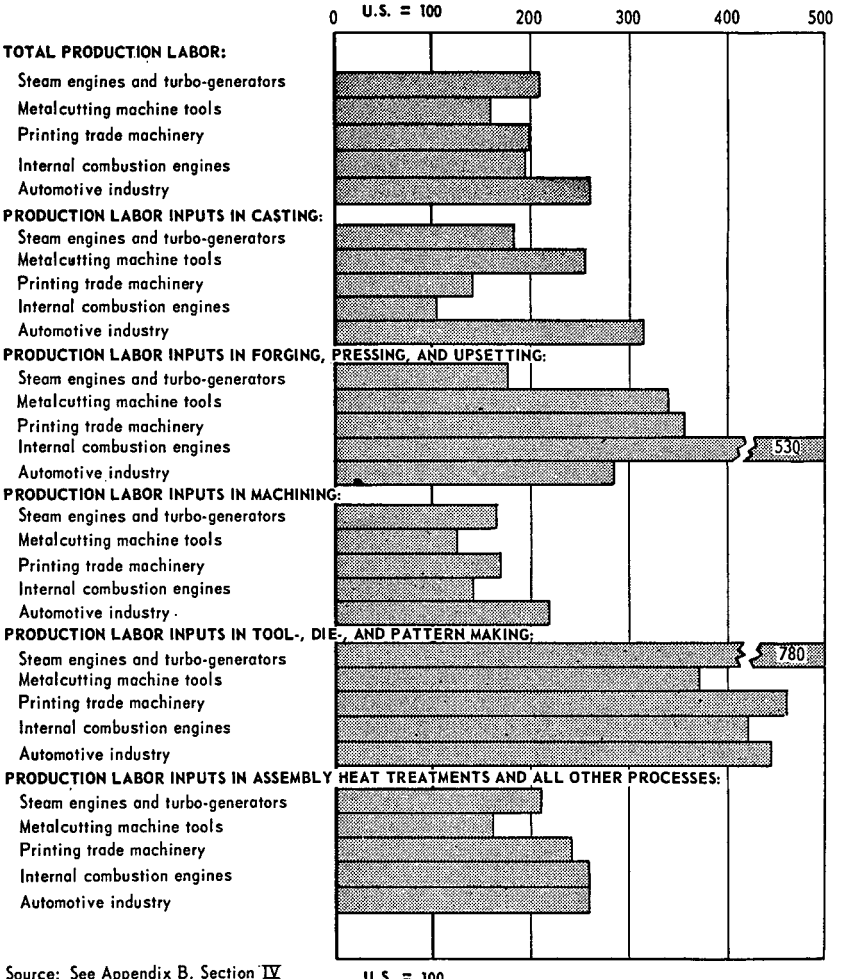
(*c*) At about half of the U.S. level in batch-type production sectors (polygraphic machinery, internal combustion engines, pumps, compressors, light construction machinery, etc., except metal-cutting machine tools);

(*d*) At about 60 percent of U.S. level in manufacture of metal-cutting machine tools, armaments, and other top-priority sectors (as that estimated for metal-cutting machine tools).

(3) The principal reasons for the heavy orientation of labor in Soviet production of machinery, as compared with the United States, is attributable to the (*a*) substitution of labor for capital (the reverse

[15] This is slightly lower than the reciprocal of the estimate for steam engines and turbogenerators shown in fig. 4 because manufacture of turbogenerators enjoys a higher priority than the others in the same scale class. Needless to say, by this I assume that top priority means more favorable investment allotments and, in turn, higher productivity.

Fig. 4
PRODUCTION LABOR INPUTS BY MAJOR PROCESSES
PER DOLLAR'S WORTH OF OUTPUT
IN FIVE SELECTED SOVIET SECTORS OF MACHINE BUILDING INDUSTRY
RELATIVE TO SUCH IN U. S.,
1958 a/



Source: See Appendix B, Section IV
a/Derived from data in man-years

of U.S. policy), and (*b*) integrated organization of processes in the production irrespective of economic disadvantages.[16] Whereas our industry relies probably as much as is economical on subcontracting, particularly for such prefabricates as castings, forgings, tools, dies, and patterns, a typical Soviet plant constitutes a wholly integrated set of processes producing virtually everything that a particular product

[16] I abstract here from any quality differences of labor if such exist between the two countries. If Soviet labor is intrinsically inferior to that in the United States, this obviously would also necessitate greater expenditures per unit of output.

line for which it was designed might require.[17] In addition, the Soviet planners apparently refuse to let the plants manufacturing original equipment also manufacture spare parts as is generally the case in the United States. Instead, with the exception of automotive industry and, partly, manufacture of agricultural implements, spare parts are manufactured in the U.S.S.R. usually at places of their demand.

As a result, most of the Soviet industry's little-used processes, particularly forging, tool, die, and pattern making, are miniaturely small shops, which require substantial amounts of overhead labor and capital to operate. The maintenance shops, in turn, constitute virtually complete small-scale manufacturing facilities in addition to the ordinary (in our sense) maintenance service they provide. Although such system would probably have some mobilization advantages in case of war, in times of peace it amounts to mammoth size inefficiency.[18]

Despite the difficulty of delineating the relative importance of the two factors as a cause of the Soviet requirement for labor to exceed that of the United States, if the employment ratios in figure 3 are differentiated by those predominately affected by the preference for integrated production and those free from such impact, one can roughly estimate that the preference for integrated production might be responsible for at least two-fifths of the excess, while capital scarcity probably accounts for not more than three-fifths.[19] For references to be made at a later point, however, the analysis should be noted in some detail:

(*a*) The only processes assumed to be subject to preference of integrated production are maintenance and tool, die, and pattern making. It will be noted from figure 3 that in maintenance the Soviets are using on the average 3.7 as much labor as we do, and in tool, die, and pattern making 2.7 as much. The five sectors defined in figure 4, however, appear to be using labor in tool, die, and pattern making even more excessively, from 2.7 to 6.8 more than ours. More than 25 percent of all Soviet excessive production labor use appears to be concentrated in these two categories of operations.

(*b*) The principal functional labor groups assumed to be largely unaffected by the preference for integrated production, in turn, are those in material handling, quality control, and "all others." In these areas the Soviets use labor from roughly 70 percent (quality control) to almost 400 percent (material handling) more extensively than we do. It is estimated that about 40 percent of the labor excess is concentrated in these three groups.

(*c*) The excess in "direct production labor" constitutes thus only about 25 percent of the total. In the two-fifths to three-fifths estimate given above, this excess is assumed to have been affected by the two factors in proportion to the excesses in functions (*a*) and (*b*).

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[17] Cf., e.g., Satel, passim; Vlasov, passim; Kheiman, passim; and Livshits, passim. Livshits, p. 246, states that more than 80 percent of Soviet machine building plants operate as "closed entities."

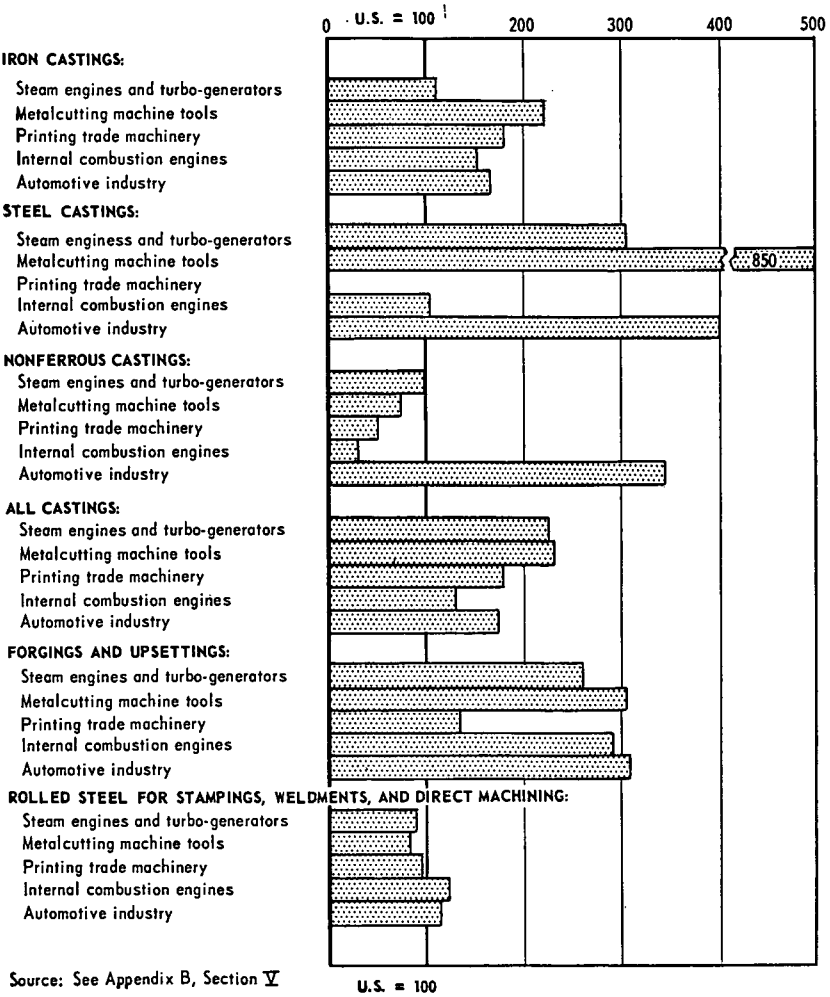
[18] In addition to military consideration, the inability to synchronize interplant supplies might also have contributed to the preference for integrated production. I think, however, that military considerations were decisive; otherwise the Soviets would have developed at least local and regional subcontracting more than they did. (See pt. III, below.)

[19] The underlying assumption is that were the Soviets to adopt specialization of maintenance and tool, die, and pattern making (the two employment groups assumed to be predominantly affected by preference for integrated production) to the same extent the U.S. industry did, and equip labor in "pure" capital scarcity operations (material handling, quality control, and "all other") to the same extent that "direct labor" is, the Soviet industry's labor input requirement in the two areas would be reduced to the ratio of "direct labor" only. Were they subsequently to add capital to all labor to the level available in our industry, their labor productivity would be the same as ours.

(4) The differences observed in manpower utilization by the two countries are paralleled to a large extent in the different methods employed for parts prefabrication.

It is noted elsewhere (fig. 2 and app. A, table 2) that whereas an average dollar's worth of Soviet machinery production in 1958 took about 40 percent more tonnage of all metals than in the United States, the use of castings alone was about 140 percent larger. As is shown in figure 5, a greater use of castings, ranging from 30 to 130 percent, is evident in all the five sectors analyzed. In contrast, rolled steel is used in the U.S.S.R., for all sectors, on the average only 12 percent more than the United States. It will be noted that several sectors use less rolled steel than does the United States.

Fig. 5
TONNAGE INPUTS OF BASIC METAL PREFABRICATES
BY TYPE PER DOLLAR'S WORTH OF OUTPUT
IN FIVE SELECTED SECTORS OF SOVIET MACHINE BUILDING INDUSTRY
RELATIVE TO SUCH IN U.S.,
1958



Source: See Appendix B, Section V

Since casting is relatively less capital intensive than other prefabricating processes, the obvious *rationale* of this Soviet practice is to save capital, primarily in the form of metal-forming machinery which is a must in other competitive processes. By not using rolled steel, however, they indirectly are also saving the capacity of rolling mill facilities, perhaps the most capital intensive element of the economy. The price paid for these capital savings includes—

(*a*) More metal input per unit of output. This metal, however, is largely in the form of pig iron and scrap, the principal inputs in (ferrous) casting process;

(*b*) Production of heavier, and, in most applications, less efficient [20] machinery than that made in the United States. This is because cast parts in comparable applications are substantially heavier than stampings or weldments even after machining,[21] and therefore require more power to operate;

(*c*) More labor inputs per unit of output because cast parts usually require more labor than stampings or weldments.[22]

(5) The pattern of prefabricates use, as shown in figure 5 reflects not only the propensity of Soviet industry toward relatively heavier machines on account of greater use of castings, but also, because of larger average size units. The Soviet building of larger unit sizes is indicated by proportionately greater consumption of steel castings and forgings than iron castings, nonferrous castings, and rolled steel prefabricates. Steel castings and forgings (particularly free forgings) are typical prefabricates of large-size machinery. This observation is very much in line with numerous allusions to that effect in the Soviet technical literature [23] as well as with what has been found in case of metal-cutting machine tools (app. B, sec. 1).

Although this practice is more a problem of differences in product mix and planning rather than technology, it has some rather interesting technological implications, both for the industry as well as the economy as a whole.

The larger average size of Soviet machinery implies that metal input (and cost of) per dollar's worth of machinery output is higher in the U.S.S.R. than in the United States. The technological reason for this is that with the increasing weight of individual parts and, hence, of machines, most inputs, particularly labor and total cost, also increase, but relatively less than the weight.[24] In effect this means that per dollar's worth of output, the Soviet industry relative to the United States is substituting metal for labor, capital, and other resources. Needless to say, this conclusion (and the differences in the pattern of the prefabricates use discussed in the preceding point) is at least qualitatively very much in line with the discrepancy in the relative metal consumption in the two industries arrived at independently, as shown in figure 2 and appendix B, section 1.

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[20] In such instances as, for example, metal-cutting machine tools, however, added weight constitutes an advantage because of vibrational stability.

[21] For data on relative rates of "chips" removal from castings, stampings, weldments, etc., see Energomashinostroenie, 1959, No. 3, p. 28.

[22] Voprosy povyshenia proizvoditelnosti, p. 259 and Palmov, pp. 183–198.

[23] See, e.g., Gokun, passim, particularly the chapters dealing with application of arithmetic and geometric progressions in planning machinery "mix."

[24] The functional relationship between labor inputs and size of machine tools is discernible from the data in app. C, table 1. A general statement derived from data on manufacture of electrical machinery given by A. S. Konson claims that labor input increases with size to the $^{2/3}$ power ($L=G^{2/3}$), and total cost to $^{3/4}$ power ($C=G^{3/4}$). See Konson, pp. 154–160.

Whether the extra value generated by larger size machinery constitutes proportionately greater benefit to the Soviet economy depends on immeasurable intercountry utility comparisons.

The indications are, however, that at least a part of the "extra size" value might contribute as much inefficiency to the Soviet economy as the one resulting from preference for integrated production, if not more. Examples of this have frequently been alluded to in the press, and have been observed by numerous U.S. tourists, e.g., 5-ton trucks for hauls that could be done with a 2-ton truck; 100-cubic-foot excavator for a job that could be done more efficiently with a 20-cubic-footer; 80 horsepower tractor for work that could be done with a 15-horsepower tractor; a huge radial drilling machine where inexpensive portable drillers would do, etc. If such "below capacity" uses of machinery in the U.S.S.R. are as common as is implied in the reports, the resulting waste of fuel, energy, and other resources to the economy must be fantastic.

(6) Yet, what has been said about excessive labor orientation, inefficiency of integrated production, and heavy reliance on casting cannot be used as sole criteria in assessing the overall technological proficiency of the Soviet machine building industry relative to the United States. The reason for this is that most of these Soviet "excesses" are apparently either rational solutions to the conditions of capital scarcity (particularly substitution of labor for capital in material handling and use of casting instead of metal forming), results of clearly politically induced irrationalities (integrated production), or irrationality in planning (apparent fascination with large-size machinery).

In the technologically crucial areas, however, their know-how, although still far behind the United States, appears to be relatively much more advanced than an overall view might suggest.

Thus it is worth noting once more that the dollar output of the Soviet production worker, in 1958, was on the average close to 70 percent of his U.S. counterpart (fig. 3), in contrast to 48 percent for all workers. In machining, which is the most important process, Soviet labor appears to be relatively more efficient by 20 to 40 percent than the overall average (fig. 4). And in foundries, except automotive, the tonnage output of Soviet workers appears to be higher or very close to that in the United States. (See figs. 4 and 5.) These observations seem to warrant the following generalization:

(*a*) The more technologically essential a process is in the Soviet industry, the closer is its efficiency relative to the United States (casting and machining).

(*b*) The more essential a sector of their industry is to the development of "heavy" industry, the more advanced is its technology relative to the United States (machine tools, internal combustion engines).

(*c*) The higher the scale of U.S. production, the further behind Soviet technology is relative to the United States.

(7) Finally, a word should be said about the formidable longrun potentiality of Soviet technology. As is shown in figure 3, the Soviet industry appears to be using 1.8 more engineers and technicians per dollar's worth of output than does our industry. This means that the Soviet industry employs 70 percent more of such personnel than does the United States. Although this estimate is likely to contain

an appreciable margin of error, I seriously doubt that a substantially different order of magnitude would be obtained if more accurate statistics were available.[25]

(8) For the sake of completeness, the comparisons in figure 3 include also the ratio of the Soviet industry's employment of managerial and clerical personnel relative to the United States (about 30 percent). This is obviously the group that does not include the Soviet employees in the centralized organizations outside the industry and is therefore subject to the limitation as set forth in the discussion of the concept of "all employees."

III. The Strategy

Without prejudging the ultimate outcome of the plan at this point, there is no doubt that the Soviets intend to exert a strenuous effort to fulfill it. The following discussion attempts to outline the strategic elements of this effort. The discussion is organized under three headings—investment, technological policy, and improvements in specialization of production.

Investment

The backbone of the plan is a massive acceleration of investment. From about 1.3 billion (new) rubles invested in the industry in 1958, the amount was increased to 1.5 billion in 1959, 1.8 billion in 1960, and almost 2 billion in 1961.[26] This is equal to an increase of almost 60 percent in just 3 years.

Although no quantitative data have been reported on the breakdown of this investment by sectors, the indications are that the lion's share goes to the manufacturing of machinery for the chemical industry, agricultural equipment, oil-processing equipment, metal-cutting and metal-forming machine tools, and machinery for light and textile industries.[27]

This program is termed "massive" not only in comparison with their own performance in the past, but even more so in comparison with the U.S. record. In terms of dollar-equivalent purchasing power, the Soviet investment of 1.3 billion rubles into machine building in 1958 was about 60 percent higher than ours.[28] Since between 1958 and 1961 our industry increased its investment only by some 20 to 25 percent,[29] as compared with 60 percent for the U.S.S.R., the Soviet industry's investment in 1961 was almost twice the magnitude of ours.

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[25] The likelihood of error in the estimate stems largely from probable differences in relative coverage of total employment as represented by the respective data on "all employees at the industry level" which were used in the derivation of the data. It appears highly improbable, however, that such error would reduce the significance level of the presented estimate to less than 90 or, at worst, to 85 percent. Since we are dealing with differences of about 200 percent, I feel that the impact of such an error for as broad a conclusion as I am making here might be disregarded.

Another qualification that should be raised is presumably more serious, but here, too, I doubt that it is serious enough to change the conclusion. The qualification stems from the probability that although the classification of "engineering and technical personnel" is the same in both satistics, many salesmen of U.S. machinery are trained technicians, but classified as "managerial personnel" (fig. 3). Though this is probably correct, I doubt that many such salesmen could readily do genuine engineering work without substantial retraining, and that those that could do such work constitute a big enough proportion to invalidate the conclusion.

[26] Narodnoe Khoziaistvo, 1961, pp. 544–545.

[27] Planovoe Khoziaistvo, 1959, No. 5, pp. 43–47; and 1962, No. 7, p. 4.

[28] The total 1958 U.S. investment into the machine-building sectors as defined in this study was about $2.2 billion (Census of Manufactures, 1958, vol. I, table 3). The purchasing power of the 1958 ruble (1961 denomination) in industrial investment is estimated to have been about $2.90. Cf. A Comparison of Capital Investment, tables 2 and 11.

[29] Cf., respectively, Annual Survey of Manufactures, 1961, and Survey of Current Business, December 1959; March 1960; and September 1962.

The rate of investment in the Soviet machine building in the remaining 4 years of the plan (1962–65), however, might be expected to be even higher than in 1961. The initial 1959–65 plan called for a total investment of 11.8 billion rubles in machine building, an increase over the preceding 7 years by 80 percent.[30] Because of the increase in the output target of the industry for 1962–65, however, this total has reportedly been substantially increased.[31]

As has been postulated in part I, however, the magnitude of economic effort cannot be measured by the value of investment alone. Two countries using the same amounts of capital might accomplish vastly different results depending, mainly, on the technological processes adopted, the proportions in which capital is combined with other inputs (the decisions regarding these two factors constitute the substance of "technological policy"), and the organization of production. As will be shown in the two subsequent sections, the apparent design of the Soviet investment program is one intended to accomplish the maximum in minimal time. Needless to say, the two objectives are rarely consistent.

Technological policy

In tracing the basic features of the technological policy the Soviets use in implementing the plan I have relied on the following three approaches:

(*a*) Analysis of the data bearing on the current and/or planned pattern of the process used relative to that established for 1958 (pt. II above). The summary of these data is presented in table 2 below;

(*b*) Analysis of the data bearing on the current introduction of major technological innovations into the industry by type of processes, areas of application, economic effects, rates of diffusion, and, to some extent, respective relative standings to the United States. Because of their bulk and largely self-explanatory contents, the detailed findings of this analysis have been placed in appendix D. Contextually, however, they belong in this section. Therefore, it would be appropriate read this appendix at this point;

(*c*) Analysis of the data that reflect directly on the current pattern of resource use.

The principal conclusions reached from these analyses are stated in the seven points below. Needless to say, the observations on which these generalizations are based are assumed to have been results of deliberate decisions rather than haphazard actions.

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[30] Narodnoe Khoziaistvo, 1958, p. 84.
[31] Planovoe Khoziaistvo, 1962, No. 7, p. 4.

TABLE 2.—*Indicators of continued orientation on casting and metal-cutting machining in the technology of Soviet machine-building industry between 1958 and 1965*

Indicator	*Percent (1958=100)*
Planned tonnage output of castings in 1965 relative to 1958 [1]	165
Planned tonnage input of rolled steel into machinery production in 1965 relative to 1958 [2]	144
Planned production of metal-cutting machine tools in 1965 relative to 1958 [3]	140–145 (195)
Planned production of metal-forming machinery in 1965 relative to 1958 [3]	140 (210)
Stock of metal-cutting machine tools in the economy in 1962 relative to 1958 [4]	126
Stock of metal-forming machinery in the economy in 1962 relative to 1958 [4]	126

[1] Liteinoe Proizvodstvo, 1958, No. 12, p. 1.
[2] Estimated from data in Material'nye balansy, p. 33 and Narodnoe Khoziaistvo, 1958, p. 67.
[3] Initial plans as given in Narodnoe Khoziaistvo, 1958, p. 67 and the revised plan (in parentheses) as given in Ekonomicheskaia Gazeta, May 17, 1961 and implied in Planavoe Khoziaistvo, 1962, No. 7, pp. 5–6.
[4] Narodnoe Khoziaistvo, 1961, p. 70.

(1) In terms of broad process use, the emphasis is still on casting and machining processes (see table 2) as it was in 1958. Casting, however, will apparently play even a more prominent role than in the past. As is shown in the table, the planned output of castings is to increase from 1958 to 1965 by almost 20 percent more than the input of rolled steel. On the other hand, the identical rates of acquisition of metal-cutting and metal-forming machine tools indicate that there is no reason to assume a rapid switch to metal forming, although the proportion of metal-forming machine tools relative to metal cutting might slightly increase in the future. The implications of this finding are—

(*a*) In spite of the massive investment program referred to in the preceding section, the Soviet planners still assume relative abundance of labor on one hand, and capital scarcity on the other.

(*b*) As in the past, the principal inputs to be economized are still metal-forming machinery and rolled steel (indirectly—rolling mill facilities).

(*c*) At least for the duration of the plan, the Soviet-built machinery will continue to be, on the average, much heavier and, presumably, larger than in the United States.

(2) Within the old pattern of the basic process use, however, the Soviets have embarked on an earnest quest for progress. This quest for progress, however, is highly uneven, both in regard to individual processes and various sectors of the industry (app. D).

(3) As to progress in individual processes, the bulk of the effort is directed to casting and machining, the main elements of their technological scheme. Of the 25 industrially important innovations summarized in appendix D, 14, or 56 percent, are in these two areas. Moreover, the innovations in casting and machining are not only more numerous than in all other processes, but also, on the average, their rate of diffusion is much more substantial. Such policy is obviously very much in line with practice observed in other areas of Soviet life whereby planners concentrate on a few key sectors or processes and allow the rest to stagnate. Since the rate of diffusion of the innovations of processes in United States industry appears to be much more balanced than in the U.S.S.R., the future disparities in the efficiency of the nonpriority Soviet processes relative to such in the United States might be expected to be even greater than in 1958.

(4) Equally uneven are the efforts to modernize individual sectors of the industry. The sectors that fall into the category of "batch" type production (and, inferentially, "custom" type) apparently will continue to receive much more favorable attention than those in the mass production category. The most effective and most vigorously pushed innovations, such as CO_2 process, use of extra heavy metal-forming presses, electric slag welding, etc., are designed for "batch" and "custom" type production. This obviously is in line with the political stress on the continued development of heavy capital goods sectors and capability for manufacture of heavy military hardware, most of which apply "batch" and "custom" type production. In the area of "batch" type production alone, however, the sector that apparently receives most attention is manufacture of metal-cutting machine tools.

(5) In adapting innovations, the Soviets currently seem to stress most those innovations which dramatically shorten the production cycle and/or save capital, and neglect those which are predominantly saving labor. The rapid rates of diffusion of such production-cycle-shortening and/or capital-savings innovations as CO_2 process, die (pressure) casting, electric slag welding and flow methods for batch-type production in machining and assembly on the one hand, and slow diffusion of such predominantly labor-saving devices as hydraulic cleaning chambers, shotblasting chambers, and material handling conveyors on the other, are lucid illustrations of this policy. From this it follows, then, that if labor efficiency in Soviet machine building should increase, it probably will occur not because of deliberate policies, but as byproducts of technological factors inherent in innovations primarily intended to produce other results.

(6) The data that reflect directly on the current manpower use indicate, however, that in at least one important instance the Soviets not only do not consciously save labor, but substitute it for capital on a grand scale. The case in point is the modernization program of 400,000 machine tools to be carried out in 1959–65. The modernization is said to increase the productivity of these machine tools by some 25 to 30 percent. When carried out, it will be equivalent to a net addition of some 120,000 machine tools. The program is slated to be undertaken by the users of the equipment themselves, mostly in accordance with the typical schemes provided by the Experimental Scientific Institute for Metalcutting Machine Tools (ENIMS).[32]

In practice, such modernization amounts to a complete overhaul of each machine. Since it will be done under highly unfavorable and, in most cases, primitive conditions,[33] it will require at least as much labor as manufacture of comparable new machines, and its total cost will be equivalent to at least 50 percent of the price of such new machines:[34] The gain of 120,000 machines will thus cost an equivalent of 200,000 new machines.

Consequently, this means, then, that in order to save capital that would be needed to construct plants capable of producing 120,000 machine tools in 7 years (about 15 percent of their annual capacity in 1958), the Soviets prefer to use at least 4 times as much labor as

[32] Cf. Ekonomicheskaia effektivnost; pp. 321–330.
[33] Konson, p. 311.
[34] Vlasov, pp. 101–102.

would be needed for new plants and pay for this excess about 5 times more than would be needed to construct such plants.[35]

This policy is obviously a complete reversal of the one pursued as late as the midfifties, the classic example of which was the case of the renowned ball bearing plant in Moscow. The bearing plant, it will be recalled, was made into an almost fully automatic facility, productivity of labor was increased by 250 percent, but the cost of ball bearings was also increased by 16 percent.[36]

(7) Finally, a note should be made about trends in Soviet technological research for the needs of machine building as suggested by the data analyzed in this paper:

(*a*) The general trend in the technological advancement implied in the data indicates that in the last decade or so, the Soviets have done a tremendous amount of technological research, both adaptive and original. By now they appear to have at least a basic know-how of all the innovations of wide applicability that have been developed abroad and have succeeded in developing two important innovations of their own.

(*b*) The two notable innovations considered to be genuinely Soviet are electroslag welding and electrochemical methods of machining. Both of them, however, have apparently been developed for military applications;[37] electroslag welding for ship and submarine construction; and electromachining—for machining "exotic" metals of which the military is probably the sole user. Electroslag welding has also wide nonmilitary application.[38]

(*c*) In adapting foreign innovations they appear to have done an excellent job in those that are applicable in heavy industry and are intended to shorten the production cycle or save capital. Thus far, however, they have contributed little of nonmilitary use even though such applications are of special interest to them.

(*d*) It seems, then, that they still prefer to borrow whenever they can, but when such opportunities are exhausted they have capability to generate their own innovation.

Improvements in specialization of production

In part II, reference was made to the Soviet preference for integrated production or lack of specialization, with resulting inefficiency. The 1959–65 plan calls for correction of this deficiency on a grand scale. The means can be technically classified into three distinct programs. Each of these, in turn, comprises a set of related measures.[39]

(1) Increased specialization of production of standardized tools, parts, and subassemblies through expanded standardization of such products, curtailed production in nonspecialized plants, expanded production in existing specialized plants, and construction of specialized plants for large-scale production.

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[35] Ekonomicheskaia effektivnost, and Vlasov, ibid.

[36] Cf. Kurakov, p. 6; and Akademiia Nauk, p. 230.

[37] It might be of some interest that the bill for the development of our most important innovation in recent times, the numerical control of machine tools, was paid by the U.S. Air Force. This obviously begs the question: To what extent was progress contingent on military support?

[38] It will be noted from app. D that in the use of electromachining and, particularly, in electroslag welding the Soviets have a substantial lead over the United States.

[39] Cf., e.g., Livshits, pp. 241–242; Planovoe Khoziaistvo, 1959, No. 5, pp. 39–47; and Omarovskii, passim.

(2) Improved specialization of parts prefabrication, building of new specialized plants that will manufacture castings, forgings, and stampings on a large scale, expansion of medium-size shops, and scrapping of small shops.

(3) Expanded production and increased specialization in existing plants manufacturing final products through expansion and reconstruction of plants, reduction of numbers of plants producing the same type of machinery, increasing interchangeability of parts for wider size-ranges of machines of the same type, reduction of variety of type-sizes of machines, and increasing scales of production of identical machines per plant.

The plan calls for construction of some 80 new specialized plants for programs listed under (1) and (2) and an unspecified number under program (3). The greatest reliance, however, is being placed on expansion and reconstruction of existing plants rather than construction of new plants. Of all investment allocated to the industry in 1959–65, 75 cercent is to be spent for expansion and reconstruction and only 25 percent for new construction. The savings to be generated by these programs are estimated to run into several billion rubles.[40]

Taking these programs at face value, they seem like a complete reversal of preference for integrated production in favor of economies of scale. The indications are, however, that while they constitute a forward step in the direction of rationality from which the economy is likely to benefit, the step is at best only a halfway compromise between the old dogma and a desire for efficiency.

The programs apparently are not designed to correct the bulk of the built-in organizational inefficiency which is concentrated in the auxiliary shops of plants, particularly in tool and die making and repair shops. According to a most recent authoritative source,[41] the projectmaking institutes continue to design new plants with all the auxiliary facilities as before. From that we may infer that if all the auxiliary shops are preserved in new plants, it appears highly improbable that they will be abolished in the expanded or reconstructed plants.

The new specialized plants for parts prefabrication, in turn, are apparently built only for local or at best narrowly regional demand and presumably for volumes of output substantially smaller than optimum. Although a "minimum optimum" capacity of a foundry appears to be in the excess of 100,000 tons per year, the "typical" designs of specialized regional foundries call for capacities of 40,000 tons (in exceptional cases for 55,000) only.[42] As a result, the average capacity of all foundries to be used in 1959–65 will be increased to only some 8–10 percent of the "minimum optimum" scale.[43]

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[40] Ibid., and Voprosy Ekonomiki, 1962, No. 1, p. 24.

[41] Kheinman, p. 81.

[42] Cf., Liteinoe Proizvodsto, 1957, supplement, pp. 33–34. The term "minimum optimum" refers to the point on a cost curve beyond which the average cost declines only insignificantly. The inference about the "minimum optimum" capacity of over 100,000 tons per year is made in accordance with the data in Livshits, p. 236 and Liteinoe Proizvodsto, 1959, No. 3, pp. 2–3, showing that a foundry with the annual capacity of 100,000 tons is about 40 percent more efficient than a foundry with 50,000–75,000 tons. The 40-percent cost differential is more than adequate to cover the transportation costs in the radius of 5,000 kilometers. See Planovoe Khoziaistvo, 1958, No. 1, pp. 24–34.

[43] The planned average increases are: gray iron foundries from 4,300 tons in 1957 to 9,000 in 1965 and steel foundries, respectively, from 3,400 to 8,500 tons. Cf., Planovoe Khoziaistvo, 1959, No. 5, pp. 40–41.

A brief comment is also in order in regard to the heavy stress on expansion and reconstruction of existing plants rather than construction of new ones. The obvious objective of this policy is to get a higher and faster payoff per invested ruble through better use of overhead, such as buildings, transportation installations, communications lines, etc., in existing plants and a faster increase in additional capacity because of the smaller volume of construction required in expansion and/or reconstruction relative to new construction.

On the basis of available data it is impossible to assess this policy conclusively. Scepticism as to the extent the paper "savings" of capital will materialize in practice is warranted. It seems quite likely that in practice these "savings" might be outweighed, perhaps severalfold, by losses of production in plants that will be subjected to prolonged disruptive expansion and/or reconstruction and by losses of potential production arising from the discontinuities of new equipment integrated with older and much less productive facilities currently remaining in use in the plants to be expanded.

As to first point, the gestation period in Soviet construction is long, irrespective of type. Hence, prolonged disruption and losses resulting therefrom are quite likely. As to the second point, the losses arising from the mixing of new equipment with the old on such a large scale are inevitable. The aphorism that a chain is as strong as its weakest link is appropriate at this point. Somehow, if the U.S. analogy could be used to illustrate the point, our businessmen have demonstratedly preferred to build new facilities rather than expand when the old ones became inadequate. The industrial relocation problems we have had for quite some time are no doubt results of careful calculation.

IV. The Likelihood of Success

The implicit question in this part obviously is: Will they succeed? The negative answer must certainly be qualified by numerous "buts." To amplify, let us consider the relative records for 1959–61, why success is unlikely, in what sense the challenge is dangerous and how it should be met. In the conclusion I will also comment on the potentialities of technological progress for growth of the U.S. industry.

The 1959–61 record—disaggregated view [44]

As in the past, the official statistics provide only a highly selective view of accomplishments. Judging by statistics on output of the individual machinery products that the Soviet officials choose to disclose, however, there appears to be no doubt that the progress has been substantial.

The most rapid growth appears to be in the production of machinery for the chemical industry, textile machinery, main line locomotives, power-generating equipment, electrical machinery, instruments, oilfield equipment, and construction equipment. The output of all these groups, or rather of the important items in these groups, appears to have increased from 1958 to 1961 by more than 30 percent. However, rapid growth of such items as chemical and textile machinery is probably due as much to the low level of the output in 1958 as to the concentrated effort in 1959–61.

[44] This brief account is based on Narodnoe Khoziaistvo, 1961, pp. 222–231.

The slowest growing sectors, in turn, appear to be agricultural equipment, if rising at all, material handling equipment, automotive industry, and metalworking machinery, all increasing by less than 30 percent. Within the latter category, the output of metalcutting machine tools (in units) increased from 1958 to 1961 by 20 percent and that of metal-forming machines by some 16 percent. Also, in the 3-year period 129,000 metal-cutting machine tools and 23,000 metal-forming machines were "modernized."

The 1959–61 probable record—an aggregated view

These commodity statistics, however, are much too selective to permit a reconstruction of an aggregate change in output of the industry as a whole. Nor is the Soviet official index of the growth in the industry as a whole a valid indicator. According to this index, the Soviet gross (*valovaia*) machinery production increased between 1958 and 1961 by 56 percent, or an average of 16 percent per year.[45] Largely because of the valuation of new products (or new models of an old machine) at initial cost (which might be as much as 700 percent of the cost of the same product a year or two later) and because of increases in the extent of duplication arising from increasing rates of interplant shipments (subcontracting), no calculation of a genuine rate of change in the sense of the "amount of work done" (unduplicated value of output) on the basis of this index is possible. In fact, under conditions of rapidly increasing specialization (see pt. III) and frequent "updating" of absolete models of machinery it is conceivable that an index based on gross production, no matter how large, may not even indicate the direction of a true change.[46]

In order to get some idea of the likely true change, therefore, an independent estimate is required. In this connection I assume:

(a) that the Soviet machine building as a whole fulfilled the annual plan for 1961. Such an assumption seems reasonable since the targets for the subsequent years have been stepped up;

(b) that the pace of aggregate technological progress was less than what it was in the United States in 1952–61 rather than any that may have been assumed in the plan. Again this seems to me as a reasonable assumption as one can have. As has been pointed out in appendix D, this period in the United States was marked by substantial progress.

On the basis of these assumptions I next translate the inputs planned to be expended for machinery production in 1961 into output magnitudes by means of the 1958 input/output coefficients corrected for the progress assumed to have been made between 1958 and 1961. Since in such a short time span technology cannot change beyond uniform gradual progress, there is no need to account for all inputs. The same objective might fairly adequately be achieved by determining the more important ones. It will be recalled that in the technology of Soviet machine building industry such leading elements are, of course, casting, rolled steel, metal-cutting machine tools, and labor.

As is shown in table 2 above, the planned output of castings for 1965 was higher than in 1958 by 65 percent, and by 1961 should have

[45] Ibid., p. 174.

[46] It might be noted that in 1958, 2,051 new types of machinery and equipment were introduced and in 1961, 3,754. Cf. ibid., p. 192.

been increased about 27 percent. I also postulate that due to technological progress from the tonnage of castings produced in 1961 the Soviet industry generated about 5 percent more value than in 1958 (because of fewer rejects, smaller tolerances, etc.)[47] Judging by input of castings, then, the Soviet industry is likely to have increased its output by some 33 percent.

Although, as is also shown in table 2, the planned input of steel, prorated over the 7 years, was smaller than that of castings, there is little reason to doubt that the input of castings could not have been matched by that of rolled steel. In fact, had they been giving to machine building the same percentage of the total rolled steel output as in 1958, that is, about 38–40 percent, they could have matched the input of castings one to one. The plan for rolled steel output was apparently overfulfilled by a sizable margin.[48]

The 33-percent increase of output appears to be also within the realm of high probability on the basis of increase in stock of metal-cutting machine tools between August 1958 and April 1962 (roughly 3 years). It is estimated that in 1958 the Soviet machine building industry had about 920,000 machine tools. By 1962, however, the stock could have increased by about 263,000 units and, as stated earlier, about 129,000 have been modernized. On the average, however, the newly acquired machine tools may be assumed to be substantially more productive than the average on the factory floor in 1958 (in strict engineering terms they presumably were more productive by some 60 percent). The modernized machine tools were probably equivalent to a net addition of some 12,000 to 15,000 new machines. Thus the effective total metal-cutting capacity of the industry increased adequately and, hence, output could have increased as postulated.[49]

Finally, there is no apparent reason to expect that such an increase in output could not have been achieved on account of manpower shortage. Between 1958 and 1961 employment of production workers in machine building is estimated to have increased by 25 percent.[50] Hence, to achieve a 33 percent increase in output, a mere 2 percent annual growth in productivity between 1958 and 1961 would have been needed.

At the same time, such an increase in output appears to me a maximum that can be assumed. Neither steel, machine tools, nor, in particular, productivity of labor suggest an appreciably higher increase.

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[47] Between 1952 and 1961 the FRB index of machinery and equipment manufacture was increasing on the average 1.2 percent, but the shipments of "miscellaneous" castings (machinery parts) were declining by 0.8 of 1 percent. Hence, per unit of U.S. machinery output the use of castings was declining by 2 percent per year. The postulated increase in value to be generated from a ton of castings in the Soviet industry by 5 percent in the 3 years is equivalent to decline in castings use in the Soviet industry by 1.67 percent per unit of output per year. Part of the decline in the United States use of castings was due to switch to stamping, a trend not apparent in the Soviet industry. This is evidence to what extent technological rigidity prevails even in this country. Cf. FRB, Industrial Production, November 1962, and Current Industrial Reports, series M–33A, 1952–61.

[48] The planned output of rolled steel for 1961 (prorated from percentage target increase by 1965) was about 53 million tons whereas actual output is reported to have been 55.3 million tons. Cf. Narodnoe Khoziaistvo, 1958, p. 62; and 1961, p. 176.

[49] Data on machine tool stocks are in Narodnoe Khoziaistvo, 1961, p. 70; the proportion of the total stock used in machine building in 1958 is given in Kheinman, p. 169; the allocation of machine tools to various machine tool-using sectors of the economy in 1959–61 is assumed to have been proportional to relative increases of employment; data on modernization of metalworking machines in 1959–61 are in Narodnoe Khoziaistvo, 1961, p. 213; the data on average changes in productivity of machine tools over time is given in Kheinman, p. 168 anr Prokopovich, p. 148. The average age of Soviet machine tools used in the industry in 1958 was probably about 15 years, as suggested by data in Kheinman, pp. 176 and 167.

[50] Estimated from Narodnoe Khoziaistvo, 1961, p. 182 using the same procedure as described in appendix A.

The reasons for the assumption of unlikely higher productivity of labor are threefold. First, as has been stated in part III of the text, in the period under consideration the Soviets pursued a highly labor-intensive technological policy and in some instances, notably in modernization of machine tools, actually substituted labor for capital. Such policy is obviously not conducive to growth of productivity. Secondly, a significant number of plants is in the process of expansion and reconstruction. This must also be considered as an obstacle for growth in productivity. Third, and finally, is the productivity—depressing influx of new workers. It is estimated that in 1960–61 every fifth worker in the industry was new. In such industry as machine building, a normal apprenticeship period is about 4 years. The newcomers usually acquire adequate experience in 2 years. Prior to that, however, they are likely to be only about 80 percent as efficient as normal work force.[51] In fact. I strongly suspect that this factor alone could not only have considerably slowed down productivity growth in 1960, but also caused an absolute decline in 1961 as compared with 1960. This obviously implies that all of the productivity growth needed for the increase of output by 33 percent must have occurred in 1959 and, perhaps, a little in 1960.

The postulated 1958–61 increase in output of the Soviet machine building industry and the actual change in United States are graphically represented in fig. 6.[52]

In the 3 years the output of our machine-building industry grew from $74.4 billion in 1958 to approximately $86 billion in 1961, or by about 16 percent. It should be noted, however, that 1958 was a recession year in the United States. The 16-percent increase, therefore, represents both, growth and recovery.

The probable growth of the Soviet industry by 33 percent in the 3 years means obviously—

(*a*) that their growth was twice the size of our growth and recovery combined;

(*b*) since in dollar terms they increased the output from $44.7 billion in 1958 to $59.5 billion in 1961, their absolute gain of $14.8 of machinery output was larger than ours by more than $3 billion;

(*c*) that their relative position of only 60 percent in 1958, increased to about 69 percent in 1961, which makes for a net gain of 9 percent in just 3 years.

The interesting point that shall be noted, is that employment in our machine building industry increased between 1958 and 1961 by only 120,000, or roughly 3 percent. Since output increased by 16 percent, this means that the productivity of our labor increased by about 4 percent annually. Since the Soviet productivity is assumed to have increased only half as much as ours, the productivity of Soviet labor in machine building relative to the United States in 1961 was by some 4 percent lower than in 1958. This, obviously, is the result of thinning out capital and skilled labor and, not less, of all other policies that have been discussed earlier.[53]

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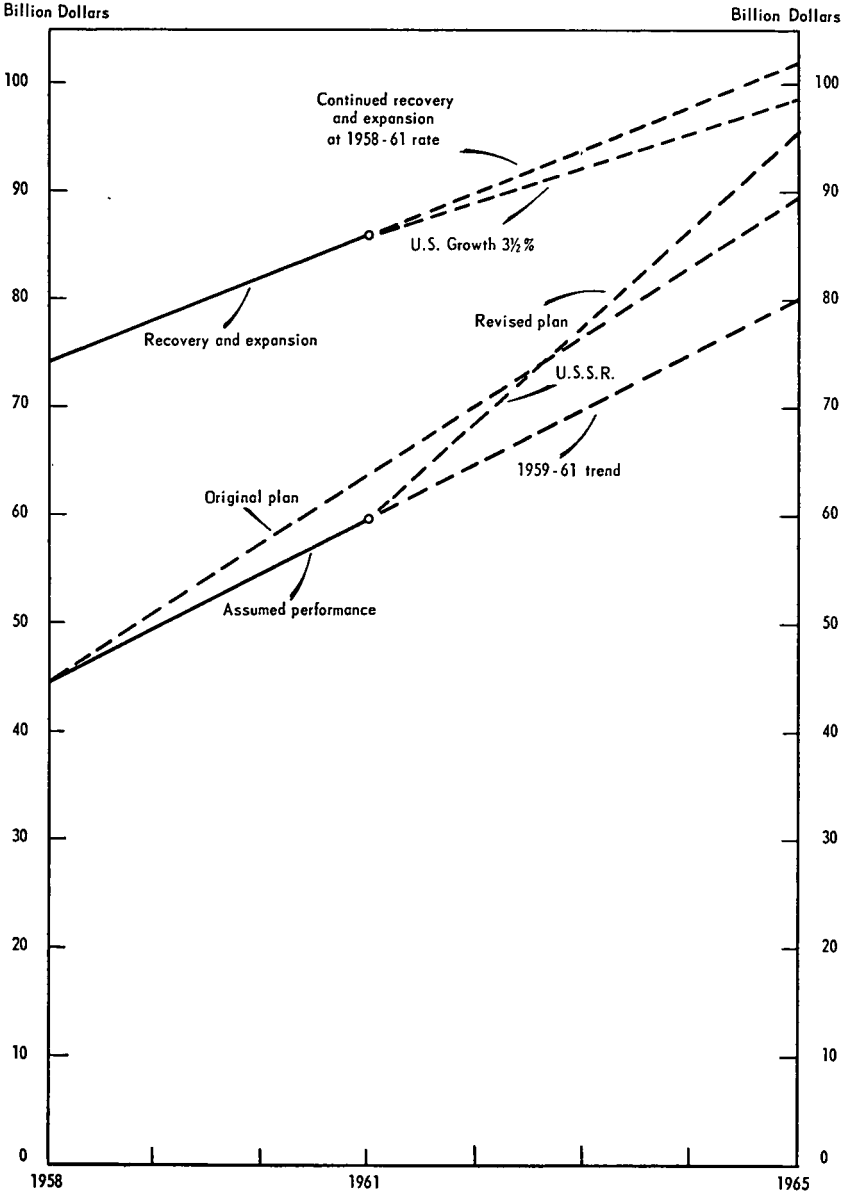
[51] Ganshtak–2, p. 53.

[52] Figure 6 is drawn on the assumption that the Soviet plan targets are stated in measures comparable to such in base period.

[53] It might be of interest to note that the consumption of electric energy per worker (elektrovooruzhennost) in machine building increased by 3.6 percent between 1958 and 1959, but declined by 1 percent in 1960. The index for 1961 was not published. Cf. Narodnoe Khoziaisto, 1961, p. 191.

Fig. 6
THE IMMINENCE OF SOVIET CHALLENGE
TO U.S. MACHINE BUILDING
(VALUE OF OUTPUT IN 1958 DOLLARS)



Source: Appendix B, Section VI

Likelihood of "catching up"

As suggested in figure 6 the probability of "catching up" with the United States by 1965 is virtually nil, barring obviously a depression or a prolonged recession in the next 3 years. Whether they will catch up with us soon thereafter, however, is an open question.

If we and they should continue to expand at the 1958–61 rate through 1965, we would reach a level of about $102 billion and they would reach about $80 billion. At such rates they would increase their relative position to roughly 78 percent by 1965.

Should we, however, slow down the expansion to, e.g., 3½ percent per year and they increase to about the level originally planned, they would be short of catching up by some 10 percent only by 1965.

I assume as unrealistic the possibility that they could achieve the real rate of growth called for by the revised plan on grounds that it would call for investment programs presumably even beyond *Gosplan's* capability to implement and/or generate bottlenecks somewhere else that would be hard to overcome. It would also call for growth in employment by some 15–20 percent per year.

Limited choices for growth of U.S. machine building

The magnitude of growth of Soviet machine building relative to the United States in 1958-61 per se would not be worrisome if it were purely economics oriented. The objectives of the Soviet growth, however, seem to be such as to leave us little freedom of choice as to how large the rate of growth of our military production should be.

TABLE 3.—*Probable end uses of Soviet machinery supplies (outputs adjusted for import surpluses) in 1958 and 1961*

End use	1958		1961	
	Million rubles	Percent	Million rubles	Percent
Total output, including import surplus [1]	16,351	100.0	21,999	100.0
Investment [2]	8,155	49.8	10,879	49.4
Consumer durables [3]	1,284	7.9	1,861	8.5
Unexplained (military acquisition) [4]	6,912	42.3	9,259	42.1

[1] The data on total output including net imports have been derived from app. A, table A–1; app. B, sec. II, and the data on foreign trade in machinery as given in Narodnoe Khoziaistvo, 1961, pp. 668–671. For purpose of comparability, the "foreign trade" rubles have been converted into domestic price equivalents at the ratio of 67 domestic kopeks per "foreign trade" ruble. The reason for this discrepancy is that the rubles in which the volume of foreign trade is reported are converted to dollars at the official exchange rate of 90 kopeks per dollar. In world machinery markets, however, the dollar-ruble conversion ratio is presumably about 40 percent less than such derived from United States-U.S.S.R. comparison. Thus the "foreign trade" ruble is equal to ($2.75 by 0.60 by 90), or 1 ruble and 50 kopeks per domestic ruble, the reciprocal of which is 0.67; $2.75 is, it will be recalled, the dollar-ruble conversion ratio implicit in the comparison of the value of output data for 1958. The estimated net imports constitute only about 1 and 2 percent of the respective totals.

[2] The data on investment of machinery have been estimated from data on investment in machinery and equipment as percent of total investment in state and cooperative enterprises given in Narodnoe Khoziaistvo, 1961, pp. 539–545, a factor 1.055 to account for investment in collective farms as suggested in "A Comparison of Capital Investment," p. 31, and a factor 0.985 to delete the cost of transporting machinery to the place of investment as suggested in Omarovskii, p. 110. In relating the investment to current production data, it was assumed that the timelag would affect the comparison only insignificantly and, therefore, was disregarded.

[3] The probable values of consumer durables are estimates derived from the data on physical quantities of most important machinerylike consumer durables produced in the respective years as reported in Narodnoe Khoziaistvo, 1961, p. 262, valued with appropriate 1958 U.S. unit values converted into rubles at the ratio of 61 kopeks to a dollar. The respective totals thus derived have been inflated by a factor (arbitrary) of 1.25 to account for undercoverage. The likelihood of error resulting from use of arbitrary factor 1.25 is believed to be negligible. The U.S. unit values have been derived from Census of Manufacturers, 1958, vol. II. The ruble-dollar ratio of 61 kopeks to a dollar is identical with the estimate by Becker for automotive industry in 1955 adjusted for U.S. wholesale price index changes from 1955 to 1958. The ratio is felt to be appropriate on grounds that the efficiency discrepancies between the Soviet and United States production of consumer durables is probably similar to such in automotive industry as noted in pt. II of the text above.

[4] The unexplained uses are residuals. Inferentially they are assumed to represent military acquisitions since other likely uses of machinery, primarily industrial stockpiles, are believed to be insignificant.

The pertinent data are given in table 3. It will be noted that only about half of the Soviet effort to expand the production of machinery between 1958 and 1961 constituted an attempt to pave the way for continued growth of the economy by providing producers' durables. The needs of the consumer were taken care of with less than one-tenth of the effort. More than two-fifths of the effort, however, went into expansion of military might in the form of military equipment. If the dollar-ruble ratio for military equipment procurement is assumed to be roughly the same as that for all machinery, the dollar value of acquisitions of machinery and equipment by the Soviet military thus increased from about $19 billion in 1958 to $25 billion in just 3 years.

The obvious implications of these findings are that the growth of our machine building industry must be viewed not only as a matter of economic welfare, but also as a matter of national security. Since there is no reason to expect any radical changes in Soviet policies in the immediate future, and assuming no substantial difference in military strategies in the two countries, our industry must grow by some 2 percent per year just to supply our military needs at the rate of the Soviet buildup.

Since machine building industry is not only a current producer of military hardware, but also the principal mobilization base in case of war, the security-induced growth requirement of our machine building must be much higher than the 2 percent. In fact, to preserve at least the current U.S.–U.S.S.R. war capacity status quo in the years to come, our machine building industry would have to grow from 1961 on at the rate about two-thirds the magnitude of the Soviet rate. Numerically, this means a growth rate in excess of 7 percent per year, or roughly 1 percent more than the expansion-recovery rate of 1958–61.

Needless to say, at our stage of industrial development and with the difficulty achieving growth by noneconomic inducements in time of peace, the requirement is indeed formidable. Yet, the true meaning of the Soviet challenge leaves little doubt about the likely consequences if we do not meet it as required.

It is obviously beyond the scope of this study to speculate on policies needed to induce the postulated rate of growth for our machine building. However, I like to conclude the study with a few comments on potential benefits to be derived from the latent forces of modernization.

Potentialities of modernization for growth of U.S. machine building

I am using the term "modernization" in the same sense as technological progress. In relating modernization of the industry to its growth, I obviously assume that the decreases in costs resulting from innovations will permit reduction or stability of prices and this, in turn, will expand the markets for the industry's products in both, at home and abroad. The innovations generating new products will expand the markets directly.

The research I have done on the subject matter to date has led me to believe that in the industry under consideration there are vast potentialities for progress, the knowledge to achieve this is readily available and much more could be obtained rather quickly and, therefore, the limitations on implementation of this goal are not technical in nature.

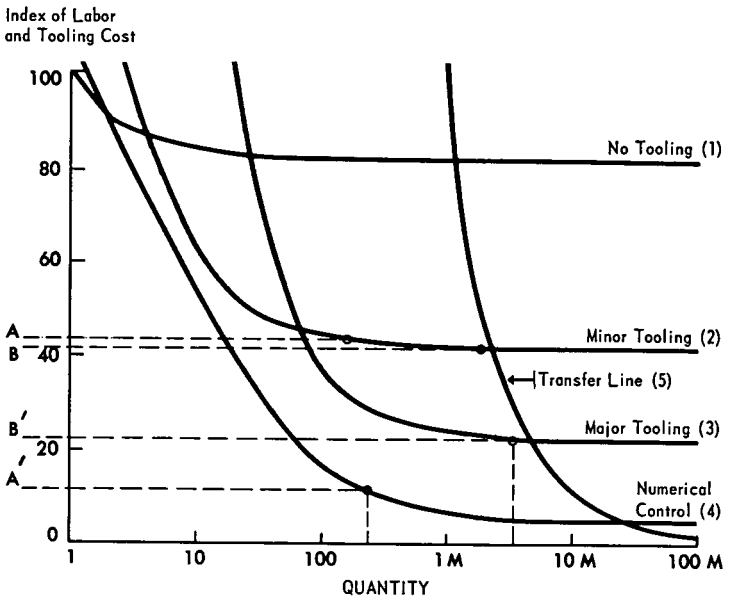
The substantial nature of our technological progress in the machine building industry in the last decade has already been noted. This term, however, was used in relative sense in regard to both the progress in

our industry as a whole and in the U.S.S.R. Most of the attribution was based upon the progress made in our mass production sectors, such as automotive industry, manufacture of agricultural implements, household appliances, etc. Recent progress in our sectors of "custom" and "batch" type production of machinery, however, has been virtually nil. (See app. D.) Even such phenomenal innovation as use of numerically controlled machine tools has been introduced at the rate that can hardly be termed progress at all (at most 3,000 units have been introduced between 1954 and 1961 out of the potential at least 50 times as great). Yet the sectors of "custom" and "batch" type production account for some two-thirds of the total value of output of the machine building industry as a whole. Should we succeed in stimulating the progress in these sectors in the near future at least half the rate made in automotive industry in the last decade, our main problem would be perhaps only half as serious as it is today.

A graphic example of the potential cost savings to be derived from the use of numerically controlled machine tools instead of conventional types in "custom," "batch," and semiproduction types of machinery manufacturing is provided by the set of curves presented in figure 7.

Fig. 7

CURRENT CHOICES OF TECHNOLOGY
IN U.S. MACHINE BUILDING INDUSTRY
(with Special Consideration of Manufacture of Machine Tools)



Source: Adapted from Brainard.

The curves represent current technological practices in choosing among alternative machining processes in U.S. production of all types of machinery varied by scale of output ranging from 1 to 100,000 units (parts or products) per year and resulting labor and tooling cost differentials per unit of output. It should be noted that labor and tooling costs incurred in machining process constitute some 25 to 35 percent of total cost of machinery manufacture. The curves have been calculated on the basis of empirical data and professional judgment of Wallace E. Brainard, an outstanding American engineer and notable contributor to the field of machine tools and machine building in general.

Curve (1), representing machining with "no (special) tooling," pertains to manufacturing process in which one to eight parts (products) are produced per year, that is, turbines, or any type of custom-made machine. If 1 machine is made, the labor and tooling cost index is designated as 100. Curve (2), machining with "minor tooling," is the usual choice when machines are made in "batches" of 9 to 90 per year. If the demand for products is unstable, however, curve (2) might be used up to about 2,000 units of annual output. Curve (3), machining with "major tooling," is rational choice if the production exceeds 90 and does not exceed seven or eight thousand. Curve (5) is the case of "Detroit automation," or transfer line. As the graph shows, it is a rational choice from output of about 8,000 units per year and up.

Curve (4), however, represents the numerical control miracle. Starting from an output of about 3 or 4 units per year, its use becomes uneconomic only in competition with transfer line at an output of about 20,000 or 30,000 units per year.

As noted, in appendix D, however, the advantages of numerically controlled machine tools, in addition to savings of labor and tooling, include also savings of capital, improvements in quality of products, and permit manufacture of some products that either cannot be manufactured by other methods or whose production by other methods is prohibitively expensive.

The case of machine tool industry

The set of curves in figure 7 provides also an opportunity of showing the likely advantages of technological progress based on numerically controlled machine tools even more vividly in case of U.S. machine tool industry as contrasted with the progress of Soviet machine tool industry based on the use of "flow lines" of production. Significance of the latter has been pointed out in the discussion of Soviet technological policy in part III above and noted in appendix D, and which, it might be recalled, has been the subject matter of numerous writings by Seymour Melman, professor of industrial engineering at Columbia University.[54] It seems to me quite likely that, if adapted on a wide

[54] Cf., e.g., New York Times, Oct. 26, 1959. Impressed with rapidly rising use of "flow lines" and therefrom resulting efficiency in Soviet manufacture of machine tools Professor Melman launched a highly publicized crusade for adoption of the "flow methods" in manufacture of machine tools in Western countries. The British Board of Trade argued in 1960 that "flow methods" are not suitable for machine tool industries in Western Europe because of inadequate demand for single models manufactured by individual Western machine tool builders (see Board of Trade, pp. 7–9). Yet, whether because of Professor Melman's crusade or not, recently at least one U.S. company appears to have adapted the method. On that, see Professor Melman's recent article in Challenge, June 1962.

enough scale, the use of numerically controlled machine tools by U.S. machine tool industry might provide for a substantially better path of progress than the Soviet industry has embarked on.

As far as can be established, an average Soviet (specialized) machine tool plant uses machining process based on "minor tooling" and produces some 2,000 to 3,000 machine tools per year. Hence, in terms of figure 7, it operates on curve (2) at point (B). An average U.S. machine tool plant also uses "minor tooling" in machining, but produces only about 300 units per year. Hence, in figure 7 its operation is at point (A). The shape of the curve on which the two plants operate indicates that the Soviet plant is likely to have some advantages of economies of scale, but rather small.

As stated earlier, the current trend in Soviet machine tool industry is toward "flow lines" of production. In terms of the technological settings of figure 7, the "flow lines" are represented by the curve (3), "major tooling." The Soviet plants that have adapted this innovation are believed to operate at point (B′) on the curve (3). As compared with the plants still operating on curve (2), point (B), the innovation results in saving of labor and tooling cost by approximately 50 percent.[55]

The structure of our industry (some 360 companies with current average output of approximately 300 machine tools per plant-year) and instability of demand apparently do not permit a general change to curve (3). Yet, our industry can change to numerical control, or curve (4). If it does, it will probably move to point (A′) and be able to reduce the costs by almost 75 percent, or 25 percent more than the Soviet industry. To achieve this, no, or only very little, increase in scale of annual output is required. Hence, numerical control appears to offer much more progress than the Soviet progress in the same industry and does not call for the amalgamation presupposed in the Soviet scheme.

Because the curves in terms of which the comparison is made have been derived from U.S. practice only, the comparison has obviously only conceptional validity. However, since United States and U.S.S.R. machining practices (see data in app. A, table A–4) do not differ greatly, it might be presumed that if such comparison were also made on the basis of data derived from the Soviet practice, it would result in substantially similar conclusions.

The question might obviously be raised why the Soviets do not "push" the numerical control. As is stated in appendix D, they have had the prototype models since 1959. One possibility why they do not go for it is that they as yet have not succeeded in "debugging" the machines and therefore could not put them into serial production. The other possibility is that this innovation is too capital-intensive for them at this time. However, it is also not unlikely that the dogmatic preoccupation with "flow lines" did not leave them much time for considering alternative solutions of the problem.

Thus far only initial steps have been taken to release the latent forces of technological progress for growth in the U.S. industry.

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[55] One Soviet source claims that the introduction of "flow method" in 8 plants with the annual output of 1,200 to 10,000 machine tools per year resulted in machining labor savings by 20 to 68 percent and total cost by 13 to 30 percent. Cf. Voprosy Povysheniia proizvoditel'nosti, p. 440.

These obviously include the recent tax credit bill and the revision of Bulletin F (amortization schedules). No doubt they will generate at least some of the desirable effects. The market stability in the last 2 years, and relative labor-management peace, if continued, will also constitute powerful factors in speeding up the modernization process.

As I see it, however, there is also a pressing need, perhaps greater than for financial incentives, for improvements in communication channels about availability of innovations and their cost-saving potentialities; release of Government-filed research memorandums on new manufacturing methods that might have nondefense applicability; and substantial expansion of Government-sponsored research in manufacturing methods for "slow growth" industries the results of which could be made available to them with no patent impediments.

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APPENDIXES

APPENDIX A. BASIC DATA

TABLE A–1.—*Selected estimates bearing on the status of Soviet machine building industry relative to United States, 1958*

Item estimated and unit of measure	U.S.S.R.	United States
All employees—1,000 men	5,559	5,082
Number of production workers—do	4,526	3,655
Man-hours of production workers—millions	9,237	7,203
Value added in manufacture—do	[1] R8,957	$47,643
Net value of output—do	[1] R16,287	$74,442

[1] New (1961) rubles.

1. SOURCES FOR DATA IN TABLE A–1

U.S.S.R.

The employment in all Soviet machinery industries has been estimated from the data given in Narodnoe Khoziaistvo, 1958, pages 131–132, adjusted for "junior service personnel" (MOP); the estimated ratio of value output of machine building alone to that of machine building and metal fabrication (approximately 80 percent) derived from pertinent data given in Ganshtak, page 81, and Eliashevich, page 41; and the average percentage breakdown of all employment in machine building alone given in Eliashevich, page 158. It has been assumed that, per unit of value, metalworking alone requires only 50 percent as much labor as does machine building. Such assumption is consistent with the data on relative cost of materials in metal fabrication and machine building given in Narodnoe Khoziaistvo, 1960, pages 145–148.

The data on hours worked per production worker are from Kheinman, page 32 and Narodnoe Khoziaistvo, 1958, page 665.

The total ruble value (unduplicated) of machinery output in 1958 has been derived from the data on originally planned output of machine building and metal fabrication in 1965 (49 billion rubles of gross production) as given in Khrushchev's speech to the 22d Congress of Communist Party, printed in Pravda, October 18, 1961; the relationship of the planned output for 1965 to the actual in 1958 (200 percent) given by Pravda, February 8, 1959; the estimated 80 percent relationship of the output of machine building alone to that of machine building and metal fabrication in 1958 as derived from Ganshtak and Eliashevich, cited above; and the data on average percent of purchased parts (16.9 percent) from Omarovski, page 11.

Value added, in turn, has been derived from the total value (roughly 55 percent) on the basis of an average cost structure in machine building industries as a whole (net of purchased prefabricates and inclusive of average profits) constructed from data given in Omarovskii, page 11, and Planovoe Khoziaistvo, 1962, No. 1, pages 14 to 26. It is interesting to note that in the cost structure, including both purchased parts and profits, the share of purchased parts is only 16.9 percent and profits 8.3 percent.

UNITED STATES

The estimates of employment, man-hours, and value added have been estimated from the Census of Manufactures, 1958, volume I (summary statistics) and volume II (industry statistics), under assumption that the SIC industries listed below roughly match the Soviet concept of machine building: 100 percent of

SIC 35 through 38, SIC 3391, 3392, 3433, 3443, 3494, 1925, 1931, 1941; 50 percent of SIC 1999 and 345; 34 percent of SIC 3493; and 62 percent of SIC 3461; 89.8 percent of SIC 332 (ferrous foundries) and 90.9 percent of SIC 336 (nonferrous foundries).

The net value of output has been estimated from value added and differential cost of ferrous metals (rolled steel, pig iron, and ferrous scrap), fuels and electricity as percent of the total value of shipments in a sample of U.S. industries as compared with such of U.S.S.R., and the ratio of value added to total net value in Soviet industry. The value added of the industries in the U.S. sample constituted about 50 percent of the total industry. The comparison showed that the average relative share of such cost in the U.S. industries is 15 percent lower than in the U.S.S.R. counterparts. Since Soviet value added constitutes 55 percent of the net (unduplicated) value of output, it has been assumed that such in the U.S. industry is 17 percent higher, or 64 percent. The estimate assumes obviously that relationship of all other material costs in the two industries is the same as for ferrous metals, fuels, and electricity. It might be of interest to note that these cost elements in the sample of U.S. industries constitute from 5 (electrical machinery) to 22 percent (bolts, nuts) and the average is about 15 percent of the value of shipments. The data for the United States are from Census of Manufactures, 1958, volume I, table 7. The specified costs in the U.S. sample have been adjusted for interindustry shipments of castings, forgings, and stampings at the rates of respective specialized industries. The data for U.S.S.R. samples are from Narodnoe Khoziaistvo, 1960, pages 145 to 148.

TABLE A–2.—*Consumption of basic metals (rolled steel and castings) in the United States and the U.S.S.R. by major sectors of machine bulding, 1958*

	U.S. consumption (thousand short tons)			U.S.S.R. consumption (thousand short tons)		
	Rolled steel	Castings	Total	Rolled steel	Castings	Total
All machine building	27,202	8,763	35,965	18,416	12,277	30,693
Automotive industry	9,600	2,642	12,242	1,390	480	1,870
Other transportation equipment (except aircraft)	1,815	248	2,063	3,214	643	3,857
Agricultural equipment (including tractors)	1,673	840	2,513	2,762	2,816	5,578
Mining, metallurgical, and petroleum equipment	472	183	655	1,842	608	2,450
Turbines and generators	208	61	269	104	57	161
Electrical machinery	4,218	527	4,745	1,767	265	2,032
Construction and material handling equipment	1,380	557	1,937	921	276	1,197
Metalcutting machine tools	63	98	161	139	579	718
All other machinery	7,773	3,577	11,380	6,277	6,553	12,830

SOURCES FOR DATA IN TABLE A–2

U.S.S.R.

The estimate of consumption of steel mills shapes in all machinery industries, 18,416,000 short tons, has been derived from the data on the share of the total output of steel mill shapes (prokat) consumed in machine building (net of non-machine-building metal fabrication), 38 to 40 percent, as given in Material'nye balansy, page 34, and the data on the total output of steel mill shapes in 1958, 47,429,000 short tons, in Narodnoe Khoziaistvo, 1960, page 244.

The total consumption of castings in all machinery industries, 12,277,000 short tons, has been estimated from the average relationship of castings consumption as percent of the total metal consumption in machine building (about 40 percent) given by Maksarev, page 40; and Liteinoe Proizvodstvo, 1958, No. 2, page 1. This average percentage relationship is consistent with similar data for various products given in other numerous sources such as, e.g., Razumov, page 10; Ganshtak, page 122; Fantalov, page 3; Vestnik Mashinostroeniia, 1949, No. 10, page 32; and others. The estimate is also basically consistent with an inde-

pendent data on the total castings output in Soviet machine building in 1958 (12,700,000 metric tons) given in Livshits, page 263.

The steel consumption in automotive industry has been determined in accordance with the basic product mix data in that industry given in Material'nye balansy, page 36; the coefficients of steel inputs per individual products in the product mix given in Narodnoe Khoziaistvo, 1960, page 149; the 1958 output data on basic products is given ibid., page 291; and an expansion factor of 1.25 to take account of unreported products and production of spare parts. The result, 1,390,000 tons, roughly checks with what the industry's production employees, approximately 150,000 workers (see Voprosy Ekonomiki, 1960, No. 1, p. 9), were capable of processing at the prevailing complementarity as shown in table A–3 below.

The steel consumption in production of metalcutting machine tools has been estimated from the average input of rolled steel per metalcutting machine tool as given in Narodnoe Khoziaistvo, 1960, page 149, and the data on the 1958 output given ibid., page 287.

The steel consumption in production of turbines and generators has been derived from kilowatt capacity produced in 1958 as given in Narodnoe Khoziaistvo, 1959, page 157, and coefficients of steel consumption per kilowatt taken from Soviet Planning Study, No. 6, supplement.

Data on consumption in other specified sectors are from Material'nye balansy page 35.

Finally, the consumption of castings in the production of the specified industries has been determined as follows:

(*a*) For agricultural equipment—from the data on average relationship of castings to total metal used in production of tractors (50 to 55 percent) given by Ganshtak, page 122, and for production of general agricultural equipment (50 percent) given by Razumov, page 10;

(*b*) For automotive industry and metalcutting machine tools—from the percentage relationships given in table B–3 below:

(*c*) for mining, metallurgical, petroleum, construction and material handling equipment from percentage relations given in Voprosy planirovaniia, pages 28–29 and Soviet Planning Study, No. 7;

(*d*) for "other transportation equipment" from percentage relationship of prefabricate use in railroad car building and ship building as given in Soviet Planning Study No. 7 and Contributions to the Development;

(*e*) for electrical machinery, estimated from relative labor inputs in various processes as given in Vestnik Elektropromyshlennosti, 1956, No. 2, page 33; ibid., No. 12, page 4; and from data on cost and inputs of ferrous metals in the industry as given in Naradnoe Khoziaistvo, 1960, pages 145–149;

(*f*) for turbines and generators—from Soviet Planning Study, No. 6, Supplement, and kilowatt capacity produced in 1958 as given in Narodnoe Khoziaistvo, 1959, page 157.

The estimates of steel and castings consumption in "all other machinery industries" are residuals.

UNITED STATES

The total consumption of steel mill shapes and forms in all machinery industries, 27,202 thousand tons, has been estimated from the Census of Manufactures, 1958, volume I (Summary Statistics) and volume II (Industry Statistics) for the SIC industries listed in the source statement for data in table A–1. The census data have been inflated by 2 percent for undercoverage and underreporting to match such estimate for the U.S.S.R. as close as possible.

The delineation of the machinery industries, including the percentage proratings of the "mixed" industries, has mostly been made in accordance with the 5- and 7-digit product mix data as given in the respective tables 5B and 6A of volume II. A few products, however, have been assigned to machine building, or left out, rather arbitrarily. This was particularly true in the case of SIC 19 (Ordnance) industries. The likely aggregate error resulting from this procedure, however, is believed to be negligible.

The need for at least some adjustment of the Census of Manufactures figures for undercoverage and underreporting is suggested in the source, vol. I, pp. 7–4 and 7–40. One percent on each count is felt to be appropriate.

As given in the table, the estimate of steel consumption is consistent with the data of the American Iron and Steel Institute on the direct shipments of steel mills to machinery industries. As compared with the Soviet consumption, however, it is probably short by the amount of steel used for weldments and other

parts made of rolled steel for machinery repairs outside the machinery industries. Though the extent of incomparability of the two estimates on this account is not known, it is felt that from the point of view of accuracy obtainable in such analysis it is highly insignificant.

The estimated total consumption of castings in all machinery industries, 8,763,000 tons, is equivalent to 96.6 percent of the 1958 output of "all other" grey iron castings, all malleable iron castings and all steel castings, and 88 percent of all nonferrous castings as reported by the U.S. Bureau of the Census, Facts for Industry, Series M33A and M33E, respectively. All other kinds of castings produced in 1958 (molds for heavy ingots, cast-iron pressure pipes and fittings and soil pipes and fittings) have been assumed to be nonpertinent to machinery industries by definition.

The percentages of consumption of pertinent castings have been derived from the data on relative consumption of castings in machinery industries and metal fabrication as given in the Census of Manufactures, 1958, vol. I, table 7–1C (consumption of purchased castings) and as implied in the data on employment of production workers in "captive" foundry operations given in table 8–1.

Since the estimate is based on production data and relative consumption rather than data on consumption alone, it supposedly includes cast parts used in machinery repair outside the machinery industries and, therefore, is assumed to be at least conceptually fully comparable to that of the U.S.S.R.

The percentages of the foundry industries, 89.8 percent of SIC 332 (ferrous foundries) and 90.9 percent of SIC 336 (nonferrous foundries), that are assigned to machinery industries have been derived from the estimates of castings consumption in machinery industries, as explained in the preceding paragraph, the data on product mix, product class specialization, value added and total employment in the two industries as given in the Census of Manufactures, 1958, vols. I and II, and the data on the total output of castings by type as reported in Facts for Industry, Series M33A and M33E. The percentages reflect the inputs of the two industries into machinery industries alone, i.e., net of inputs used in production of nonpertinent castings and in production of pertinent castings for nonmachine building metal fabrication uses.

The estimates of steel and castings consumption in individual sectors come from the Census of Manufactures, 1958, vol. II, table 7 (consumption of materials) and table 9 (metalworking operations). The steel consumption includes interindustry shipments of forgings and stampings, if any, and castings consumption includes purchased castings as well as castings produced and consumed within the respective industries.

The estimates of steel and castings consumption for "all other machinery industries" are residuals (total consumption in "all machinery industries" minus consumption in automotive industry, for agricultural equipment and for metalcutting machine tools).

TABLE A–3.—*Percentage distributions of all employees in the United States and the U.S.S.R. machine building industries by major functional groups, 1956–59*

Type of employees	United States [1]	U.S.S.R.[2]
1. Management and clerical personnel	17.9	3.0
2. Engineering and technical personnel	8.5	13.1
3. Direct production workers	47.4	38.2
4. Maintenance and repair workers	5.7	11.6
5. Tool-, die-, and pattern-making workers	4.2	6.2
6. Material handling, storage and transportation workers	5.0	13.5
7. Quality control workers	4.3	4.0
8. All other workers	7.0	10.4
Total	100.0	100.0

[1] United States distribution is based on a sample of 53 plants with 93,765 employees surveyed by the editors of Factory Management and Maintenance in 1957, published ibid., September 1957.

[2] U.S.S.R. data are derived from a distribution of production workers in a sample of 160 plants with 426,000 employees surveyed in 1956–9 and distribution of "nonproduction" employees given by Eliashevich, p. 158. Of the 160 plants, 152 were surveyed by the Central Statistical Administration early in 1956 and 8 plants by the Institute of Economics of the U.S.S.R. Academy of Sciences in 1959. The data appear in Kheinman, pp. 110–112. The author releasing the data derived from the two surveys combined in 1961 contended that the 1956 data "were adequately accurate for contemporary state of affairs." See ibid., p. 51 note.

TABLE A–4.—*Composition of labor inputs by major technological processes per 1,000 tons of basic prefabricates consumed in selected United States and U.S.S.R. machinery industries, 1958*

[In man-years]

Technological process	Steam engines and turbines		Metal-cutting machine tools		Printing trade machinery		Internal combustion engines		Automotive industry	
	U.S. (SIC 3519)	U.S.S.R.	U.S. (SIC 3541)	U.S.S.R.	U.S. (SIC 3555)	U.S.S.R.	U.S. (SIC 3511)	U.S.S.R.	U.S. (SIC 371)	U.S.S.R.
Casting (all types)	8.1	10.6	18.4	25.7	21.8	21.9	25.0	18.4	3.7	8.2
Forging, pressing and upsetting	7.5	9.2	1.7	3.2	3.7	9.2	1.8	6.7	1.0	2.0
Steel fabrication (weldments)	6.6	17.6	2.0	.2	3.2		.9	.2	.7	.7
Stamping, blanking and forming		.8	1.0	1.3	1.5	2.2	1.2	1.4	6.0	17.7
Machining	28.2	33.2	137.7	96.8	120.9	145.9	42.9	42.6	7.2	11.1
Tool, die and pattern making	3.5	19.2	14.5	29.5	10.5	34.5	6.4	19.1	3.7	11.6
Assembly, heat treatment, galvanizing, quality control, storages, intraplant transport, maintenance, and other	67.9	90.4	103.3	90.0	95.0	164.1	39.9	76.1	21.3	31.8
Total	121.8	181.0	278.6	246.7	266.6	377.8	118.1	164.5	43.6	83.1

Sources:

U.S.S.R.: With slight corrections to account for newer information, the data on labor inputs in basic processes (casting, forging, steel fabrication, stamping, machining, assembly, and heat treatment) come from Soviet Planning Study No. 6, Supplement; No. 7; and Contributions to Development. The data on all other labor inputs (in auxiliary shops) have been derived from percentage relationships given in Vlasov, passim, and Kheinman, pp. 11–124.

U.S.: Census of Manufactures, 1958, vol. II(Industry Statistics), tables 1, 9, and 7. The data have been adjusted for interindustry shipments o .castings, forgings, and stampings.

TABLE A–5.—*Composition of 1,000 tons of basic prefabricates consumed in selected United States and U.S.S.R. machinery industries, 1958*

[Short tons]

Type of prefabricates	Steam engines and turbines		Metal-cutting machine tools		Printing trade machinery		Internal combustion engines		Automotive industry	
	U.S. (SIC 3519)	U.S.S.R.	U.S. (SIC 3541)	U.S.S.R.	U.S. (SIC 3555)	U.S.S.R.	U.S. (SIC 3511)	U.S.S.R.	U.S. (SIC 371)	U.S.S.R.
Iron castings (grey and malleable)	71	54	588	710	492	637	565	596	200	230
Steel castings	131	282	13	61	----------	----------	4	3	6	17
Nonferrous castings	13	9	12	5	18	6	117	25	7	17
Forgings (steel)	111	203	40	67	128	123	96	197	69	153
Rolled steel for direct machining, part fabrication and stampings	604	386	341	157	344	230	200	177	704	570
Nonferrous mill shapes	70	67	7	----------	18	4	18	2	14	13
Total	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Sources:
U.S.S.R.: Soviet Planning Study, No. 6, Supplement, No. 7, and Contributions to Development.

United States: Census of Manufactures, 1958, vol. II, tables 7 and 9. As in table A–4 the data account for both captive and commercial (specialized) production of the pre fabricates.

APPENDIX B. DERIVATION OF THE DATA GRAPHICALLY REPRESENTED IN FIGURES 1–6

I. FIGURE 1: THE PROBABLE VALUE OF OUTPUT OF SOVIET MACHINE BUILDING INDUSTRY RELATIVE TO UNITED STATES

The indexes of probable value of output of Soviet machine building industry relative to the United States graphically represented in figure 1 are results of the analysis of value data and of technological considerations. The procedures used are described under four headings: Determination of Soviet output of machine tools relative to the United States; Technological test of adequacy of the value comparison of Soviet output of machine tools; Determination of Soviet output of machinery by sectors other than manufacture of machine tools.

The Soviet output of machine tools relative to the United States

(1) For determination of the Soviet output of machine tools relative to the United States we have the following data:

(*a*) in terms of physical units, the Soviet output was 126 percent of ours, 138,600 versus 109,800 in United States. (*Narodnoe Khoziaistvo*, 1958, pp. 232–233, and *Census of Manufactures*, 1958, vol. II, SIC 3541, table 6A);

(*b*) in terms of consumption of basic metals, the Soviet machine tool industry's consumption was 446 percent of ours (app. A, table A–2);

(*c*) in value terms, the Soviet industry's output was roughly 277.2 million new rubles versus $592.5 million in United States (average price of Soviet machine tool was 2,000 rubles, see *Material'nye balansy*, p. 213 and as implied in *Ekonomicheskaia effektivnost'*, p. 329. U.S. data are from *Census of Manufactures, op. cit.*);

(*d*) According to my comparison of prices of about 90 models of Soviet machine tools (about half of the total listed in sources available in this country) with comparable U.S. makes, the dollar/ruble ratio is $5.26/1 ruble. The same comparison showed that, on the average, Soviet machine tools of basically the same technical specifications are about 25 percent heavier than U.S. counterparts.

(2) The purpose in comparing the two industries, is to measure the relative magnitudes of "the amounts of work done." Neither physical units nor the tonnage consumption of metal could adequately indicate the relative magnitudes of the amounts of work done. The comparison that appears in figure 1 is therefore derived from the value data. Application of the above conversion factor yields a Soviet output of $1,458.2 million, which is 246 percent of U.S. production. Rounding this percentage to the nearest digit of 5, gives the U.S.S.R. 1958 machine tool output about 145 percent greater than the United States.

(3) In this comparative estimate, I assume that some 25 percent of the metal used in the Soviet industry represents the overweight of the Soviet machines and that the remaining 75 percent is accounted for by products of lesser quality and/or, on the average, substantially larger unit sizes.

Technological test of adequacy of the value comparison of Soviet output of machine tools relative to the United States

To test the adequacy of the value estimate and the hypothesis of quality differences, I have made a comparison of the 1958 output of machine tools in the two industries by means of technologically required effort units. The comparison employs three concepts:

(*a*) Conventional (physical) units of machine tools of a specified functional type, such as lathes, milling machines, boring machines, etc.;

(*b*) Indexes of average complexity of a conventional unit relative to an average lathe, i.e., ratios of the amount of technologically required effort (man-hours) in production of average machines of respective functional types to the amount of effort required in the manufacture of an average lathe. Broadly, the indexes are functions of kinematic design variations, number of parts in a machine, number of original (specific) parts, etc.:

(*c*) Indexes of relative effort requirements in manufacture of machinery parts depending on their weight (size).

The data, calculation procedure and the results of the comparison are shown in table B–0. Column (1) lists the names of the major functional types of machine tools produced in the United States and U.S.S.R. Column (2) gives

the values of the average complexity (effort requirement) of the various functional types of machine tools listed in column (1) relative to an average lathe. Columns (3) and (6) give the numbers of the functional types of machine tools produced in 1958 in, respectively, the United States and U.S.S.R. Columns (4) and (7) give the respective outputs of conventional units in complexity equivalent units alone, that is, without consideration of average size (weight) differences. Finally, columns (5)and (8) give the respective totals adjusted for the relative effort requirements to reflect that Soviet machine tools are about 3.3 times as heavy (large) as are ours.

TABLE B–0.—*Comparison of the 1958 output of metal cutting machine tools in the United States and the U.S.S.R. by means of conventional and technological effort equivalent units*

Type of machine tools	Indexes of average complexity relative to lathes [1]	United States			U.S.S.R.		
		Output in conventional units (as reported in statistical sources)[2]	Output in complexity equivalent units [3]	Total effort in complexity and weight equivalent units [4]	Output in conventional units (as reported in statistical sources)[2]	Output in complexity equivalent units [3]	Total effort in complexity and weight equivalent units [4]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lathes (engine and turret)	1.00	13,615	13,615	----------	42,414	42,414	----------
Automatic and semiautomatic lathes	2.96	3,368	9,969	----------	3,301	9,771	----------
Boring machines	6.48	1,403	9,091	----------	970	6,286	----------
Drilling machines	.31	10,951	3,395	----------	39,642	12,289	----------
Milling machines	1.31	11,004	14,415	----------	15,385	20,154	----------
Grinding machines	1.47	52,335	76,932	----------	7,762	11,410	----------
Broaching machines	1.78	171	304	----------	554	986	----------
Planers	1.81	67	121	----------	416	753	----------
Tool and cutter grinders	.78	2,892	2,256	----------	3,188	2,487	----------
Gear cutting machines	3.09	806	2,491	----------	2,772	8,565	----------
Other	1.43	13,142	18,793	----------	22,204	31,752	----------
Total	----------	109,755	151,382	151,382	138,608	146,867	323,107

[1] The indexes were estimated by the Soviet Scientific Research Institute for Technical Normatives and published in an article by K. Kuznetsova and G. Sergeeva in Vestnik Statistiki, 1960, No. 6, p. 27. Similar, but more general data, appeared earlier in Davydovskii, pp. 287–305, reprinted in full in app. C, table C–1.

[2] The U.S. data are estimates from Census of Manufactures, 1958, vol. II, SIC 3541, table 6A. The data for U.S.S.R. come from Narodnoe Khoziaistvo, 1958, pp. 232–233, adjusted for "special, specialized, and combination machines" as in Soviet Planning Study, No. 7, p. III–9.

[3] The output figures in complexity equivalent units are products of conventional units multiplied by respective indexes of technological complexity; that is, for United States, col. (2) by (3); and for U.S.S.R., col. (2) by (6).

[4] The calculations are in terms of net weight of machines. The average U.S. machine tool is assumed to weigh about 1.1 tons (about 85 percent of gross metal input), whereas net weight of an average Soviet machine is estimated to be about 3.3 tons; that is, about 3 times as much. At such weight relationship, the Soviet machine requires not 3.3 as much effort as the United States, but only about 2.2 times as much. Cf. App. C, table C–1 and reference to Konson's increase in labor imports to $\frac{2}{3}$ power with increased weight made in section on technology, pt. II above.

The comparison produced exceedingly interesting and important results. First, the U.S. output of machine tools in 1958 was about 30 percent more complex (more "sophisticated" in journalistic parlance) than the U.S.S.R. output. This is shown by the relative changes in output measures derived by comparing conventional and complevity equivalent units (changes from cols. (3) and (6) to (4) and (7), respectively) :

$$\frac{151,382}{109,755} \div \frac{146,867}{138,608} \times 100 = 130$$

Moreover, Soviet machine tools are, on the average, 3.3 times as heavy as those in the United States, but are only 2.2 times as costly. Taking the weight of U.S. machine tools as 100, the effort required to produce the Soviet machine tools 230 percent heavier than U.S. machines is only 120 percent greater. (cf. change of Soviet industry's effort requirements as shown in cols. (7) and (8)).

To ascertain the reliability of these findings, I assumed that if the respective total effort requirements as estimated in columns (5) and (8) are reflective of the actual efforts expended in the two industries, they should be proportional to the respective value added. This hypothesis has been tested with data in table B–0. The results are as follows:

The value added in the U.S. machine tool industry constitutes 62 percent of the value of shipments (Census of Manufactures, 1958, vol. II, industry SIC 3541.) The total of 151,382 of column (5) divided by 0.62 equals to 244,164. The value added in the Soviet industry, in turn, is 56 percent of the total value (Livshits, p. 227). The Soviet total effort of 323,107 units of column (8) divided by 0.56 equals to 576,976. Taking the U.S. figure as 100 percent, the index for U.S.S.R. becomes 236.

Considering the likelihood of errors in practically each step, the result of this test, virtually identical with the results obtained from value comparison, is almost too close to have occurred by pure chance. Yet there are no a priori reasons to question the validity of the technological complexity indexes, the indexes of the relative effort requirement depending on weight (size) of parts, or the 5.26 dollar/ruble conversion factor for machine tools.

In the field of machine tools there are obviously qualitative factors other than complexity, such as accuracy, productivity, durability, etc. With the presently available data, it is impossible to trace them. It is also not known to what extent they are "economic," to use Milton Gilbert and Irving Kravis' term, that is, to what extent superiority in these respects call for greater inputs. If so, they presumably are included in the prices and at least to some extent in conversion ratio. (In deriving it, each of my observations was defined in terms of 8–10 technical specifications, such as type, capacity of electric motors, size of table, range of speeds, etc.) Consequently, the comparison of the Soviet output of machine tools relative to the United States is considered to be as close to reality as is possible with current data limitations.

The importance of the test, however, extends beyond the sphere of machine tools. It seems to suggest that:

(*a*) Soviet prices of machinery are basically proportional to the effort spent in their manufacture as in the United States. The known absence of such cost elements as interest on capital, rent, and inadequate amortization in the Soviet cost accounting, apparently does not distort relative prices substantially. This obviously does not imply that in U.S.S.R. there are no subsidies for production of some kinds of machinery, or levies on others;

(*b*) The quality difference between Soviet and United States made machinery is substantial. The 30 percent difference in effort requirements for the same amount of product as revealed in machine tools, however, probably constitutes an upper limit in any comparable group of machines;

(*c*) The use of conversion factors in assessing the magnitude of the "amount of work done" in Soviet machinery production is a fairly reliable tool, provided such a factor is derived from a representative sample of comparable products or adjusted for qualitative differences. In view of basic proportionality of Soviet prices to effort, the samples of individual groups of machines may be quite small.

Index of probable total value of Soviet machinery output relative to United States

The dollar/ruble ratio implicit in the conversion of the Soviet total ruble value of output (app. A, table A–1) into dollars is $2,75 to a ruble. It is about 5 percent lower than the reciprocal of the 1955 CIA ruble/dollar ratio (4:1) adjusted for the 1955–58 price changes (cf. Comparison of Capital Investment, table 9, p. 39 and table 11, p. 43). The total ruble value of Soviet machinery output of 16,287 million rubles, multiplied by $2.75, is equivalent to $44.7 billion, or roughly 60 percent of U.S. output, as is shown in figure 1.

Although probably still somewhat on the high side, the estimate is basically consistent with the technological potential of producing that much value with metal consumption equal to 85 percent of the amount used in the U.S. industry.

As compared with the conditions found in manufacture of machine tools, this estimate implies that the disparity in overweight, quality, and sizes of machinery between the Soviet machine-building industry as a whole and that of the United States is only about half as great as in the two respective machine tool sectors. This is primarily evident from the extent to which value indexes deviate from respective indexes of metal inputs. Whereas the Soviet machine tool sector generates only about 55 percent as much value from a ton of metal input as U.S.

machine tool manufacturers (the consumption of basic metal by Soviet machine tool sector was 446 percent of such in the United States, but value of output only 245 percent, that is, 55 percent (see tables B–1 and B–2 below), the Soviet machine building industry as a whole generated about 70 percent as much as ours (total metal consumption of Soviet industry was 85 percent of ours, but value only 60 percent; hence, 60:85=70 percent (see ibid.).

As an a priori proposition, this seems reasonable on all three counts. First, a larger overweight in machine tools appears quite likely on grounds that occasionally added weight in machine tools is desirable for vibrational stability. Secondly, machine-tool sector offers much more room for quality variations than any other sector of machine building. Hence, the quality disparity should be much less in machine-building industry as a whole than in machine-tool sector. And, thirdly, since the Soviet machine-tool sector works primarily for the expansion of machine building as a whole, its output is likely to have much more size variations than the machine-building industry as a whole.

In short, the estimate of the total value of Soviet output of machinery as 60 percent of our industry is considered within the realm of a rather high probability. The estimate unquestionably also accounts for the major qualitative disparities between the two industries.

Indexes of probable value of Soviet machinery output by sectors other than manufacture of machine tools

The indexes of the Soviet probable value of output by sectors other than machine tools have been derived from the indexes of metal consumption in these sectors relative to such in the United States (app. A, table A–2 and table B–2 below) and the assumption that their coefficients of effective metal utilization relative to U.S. respective sectors are approximately the same as for the industry as a whole. Thus the indexes of the probable value of output in each specific sector other than machine tools is equal to the respective index of metal consumption (table B–2), multiplied by the ratio of 60:85, or 0.70.

The numerical equivalents of the graphical comparisons presented in figure 1 are summarized in table B–1.

TABLE B–1.—*Probable value of output of Soviet machine building industry relative to United States, 1958*

	U.S.S.R. as percent of United States (U.S.=100)
Total value of output in all machine-building industry	60
Automotive industry	10
Other transportation equipment, except aircraft	130
Agricultural equipment, including tractors	155
Mining, metallurgical, and oil processing equipment	260
Turbines and generators	40
Electrical machinery	30
Construction and material handling equipment	50
Metal-cutting machine tools	245
All other machinery	80
All machinery production except automotive	85
All machinery production except automotive and electrical	100

II. FIGURE 2. COMPARISON OF EMPLOYMENT, PRODUCTIVITY, AND CONSUMPTION OF BASIC METALS

The indexes of all employees (at the industry level), number of production workers and man-hours, have been derived from the data in appendix A, table A–1, and the indexes of metal imports from the data on the basic metal consumption given in table A–2.

The indexes of output per production man-year and production man-hour are derived from the index of value of output as given in table B–1 and the indexes of number of production workers and man-hours by means of formula:

$$\frac{\text{Index of value of output}}{\text{Index of number of production workers (or man-hours)}} \times 100$$

The numerical values of the graphs presented in figure 2 are summarized in table B–2.

TABLE B–2.—*Employment, productivity, and consumption of basic metals in Soviet machine-building industry relative to the United States, 1958*

	U.S.S.R. as percent of United States (U.S.=100)
All employees (at the industry level)	109
Number of production workers	124
Man-hours of production workers	128
Output per production man-year	48
Output per production man-hour	47
Consumption of basic metals (rolled steel and castings):	
All industry	85
Automotive industry	15
Other transportation equipment except aircraft	187
Agricultural equipment, including tractors	222
Mining, metallurgical and oil processing equipment	374
Turbines and generators	60
Electrical machinery	43
Construction and material handling equipment	67
Metal-cutting machine tools	446
All other machinery	113

III. FIGURE 3. COMPARISON OF LABOR INPUTS OF ALL EMPLOYEES (AT THE INDUSTRY LEVEL) BY MAJOR FUNCTIONAL GROUPS PER DOLLAR'S WORTH OF MACHINERY PRODUCTION

The numerical values of the graphs in figure 3 are given in table B–3. They have been derived from the data on percentage distribution of all employees at the industry level presented in appendix A, table A–3, the index of value of output of Soviet machine building industry relative to the United States given in table B–1, and the index of all employees given in table B–2 by means of the formula:

$$\frac{E}{Q}\cdot\frac{Ps}{Pus}\times 100,$$

Where E equals index of "all employees" in the Soviet industry relative to the United States; Q equals index of the Soviet industry's value of output relative to the United States; Ps equals percent of a given functional group of Soviet employment in the total; and Pus equals same in the United States.

TABLE B–3.—*Labor inputs of all employees in Soviet machine building industry by major functional groups per average dollar's worth of machinery production relative to the United States, 1958*

	U.S.S.R. as percent of United States (U.S.=100)
Management and clerical personnel	30
Engineering and technical personnel	280
Direct production workers	146
Maintenance and repair workers	369
Toolmaking, diemaking, and patternmaking workers	266
Material handling, storage, and transport workers	494
Quality control workers	172
All other "indirect" workers	269

IV. FIGURE 4. COMPARISON OF PRODUCTION LABOR INPUTS BY MAJOR PROCESSES PER DOLLAR'S WORTH OF OUTPUT IN FIVE SELECTED SECTORS

The comparisons have been derived from the data given in appendix A, table A–4 and an assumption that per dollar's worth of output the Soviet machine tool sector must process 80 percent more tonnage of basic prefabricates than our machine tool sector, and all other sectors must process 43 percent more. The numerical values for the graphs are given in table B–4.

TABLE B–4.—*Production labor inputs by major processes per dollar's worth of output in 5 selected Soviet sectors of machine-building industry relative to such in the United States, 1958* [1]

Type of labor input and sector of the industry	U.S.S.R. as percent of United States (U.S.=100)
1. Total production labor inputs:	
(*a*) Steam engines and turbogenerators	210
(*b*) Metalcutting machine tools	160
(*c*) Printing trade machinery	200
(*d*) Internal combustion engines	195
(*e*) Automotive industry	270
2. Production labor inputs in casting:	
(*a*) Steam engines and turbogenerators	185
(*b*) Metalcutting machine tools	255
(*c*) Printing trade machinery	140
(*d*) Internal combustion engines	105
(*e*) Automotive industry	315
3. Production labor inputs in forging, pressing, and upsetting:	
(*a*) Steam engines and turbogenerators	175
(*b*) Metalcutting machine tools	342
(*c*) Printing trade machinery	355
(*d*) Internal combustion engines	530
(*e*) Automotive industry	285
4. Production labor inputs in machining:	
(*a*) Steam engines and turbogenerators	165
(*b*) Metalcutting machine tools	125
(*c*) Printing trade machinery	170
(*d*) Internal combustion engines	140
(*e*) Automotive industry	220
5. Production labor inputs in toolmaking, diemaking, and patternmaking:	
(*a*) Steam engines and turbogenerators	780
(*b*) Metalcutting machine tools	370
(*c*) Printing trade machinery	460
(*d*) Internal combustion engines	420
(*e*) Automotive industry	445
6. Production labor inputs in assembly heat treatments and all other processes:	
(*a*) Steam engines and turbogenerators	210
(*b*) Metalcutting machine tools	160
(*c*) Printing trade machinery	240
(*d*) Internal combustion engines	260
(*e*) Automotive industry	260

[1] Derived from data in man-years.

V. FIG. 5: COMPARISON OF TONNAGE INPUTS OF BASIC METAL PREFABRICATES IN FIVE SELECTED SECTORS

The derivation of the indexes in this comparison is analogous to that given in fig. 4. The underlying data are given in appendix A, table A–5.

The numerical values underlying the graphs in fig. 5 are in table B–5.

TABLE B–5.—*Tonnage inputs of basic metal prefabricates by type per dollar's worth of output in 5 selected sectors of Soviet machine building industry relative to such in the United States, 1958*

Type of prefabricate and sector of the industry	U.S.S.R. as percent of United States (U.S.=100)
1. Iron castings:	
(a) Steam engines and turbo-generators	110
(b) Metal-cutting machine tools	220
(c) Printing trade machinery	180
(d) Internal combustion engines	150
(e) Automotive industry	165
2. Steel castings:	
(a) Steam engines and turbo-generators	305
(b) Metal-cutting machine tools	850
(c) Printing trade machinery	---
(d) Internal combustion engines	105
(e) Automotive industry	400
3. Nonferrous castings:	
(a) Steam engines and turbo-generators	100
(b) Metal-cutting machine tools	76
(c) Printing trade machinery	50
(d) Internal combustion engines	30
(e) Automotive industry	345
4. All castings:	
(a) Steam engines and turbo-generators	225
(b) Metal-cutting machine tools	230
(c) Printing trade machinery	180
(d) Internal combustion engines	130
(e) Automotive industry	175
5. Forgings and upsettings:	
(a) Steam engines and turbo-generators	260
(b) Metal-cutting machine tools	305
(c) Printing trade machinery	136
(d) Internal combustion engines	290
(e) Automotive industry	310
6. Rolled steel for stampings, weldments, and direct machining:	
(a) Steam engines and turbo-generators	90
(b) Metal-cutting machine tools	85
(c) Printing trade machinery	95
(d) Internal combustion engines	125
(e) Automotive industry	115

VI. FIG. 6: CHANGES IN U.S. AND SOVIET VALUE OF OUTPUTS BETWEEN 1958 AND 1961 AND PROJECTIONS TO 1965

(1) The 1958 outputs of $74.4 and $44.7 billion for United States and U.S.S.R., respectively, are of course the same as estimated in section I above.

(2) The 1961 U.S. value of output of $86 billion, roughly 116 percent greater than in 1958, has been estimated from value added data of Annual Survey of Manufactures, 1961, an assumption that value added in 1961 constituted the same proportion of the total value (unduplicated) as in 1958 (64 percent) and BLS Wholesale Price Index for machinery and motor products (1957–59=100; 1961=102). The estimated increase by 16 percent compares favorably with 15.5 percent increase in tonnage shipments of steel mill shapes and forms by primary producers to major sectors of U.S. machine-building industry as reported by American Iron and Steel Institute (AISI), Form 16, 1958 and 1961.

(3) The assumptions underlying the estimate of growth of Soviet machine building in 1959–61 are stated in the text of part IV.

(4) The Soviet goal originally planned has been plotted in accordance with Pravda, February 8, 1959, and the revised goal is in accordance with Pravda, October 18, 1961.

Appendix C. Supporting Data

On several occasions in the text and preceding appendices reference has been made to valuable information regarding normative labor inputs in manufacture of machine tools worked out by the Soviet Scientific Research Institute for Technical Normatives and the physical input coefficients for a variety of machinery products currently manufactured by the Soviet industry. For the benefit of the readers interested in the subject matters at a greater detail than could have been explored in this study, they are submitted here in full.

Table C–1 contains direct labor norms for manufacture of machine tools, net of foundry and forging work. The norms vary relatively to the weight (size) of machines, complexity (indicated by number of original parts) and scale of annual output. Hence the data should be of practical interest to the manufacturers of machine tools and theoretical interest to the economist. It should be noted that—

(*a*) despite of the "normative" character of the data, they presumably are fairly close to the current actual performance of the pertinent labor group. According to a fairly authoritative recent information (Vestnik Statistiki, 1960. No. 6, pp. 28–29) they were virtually identical with actual performance in 1957 and, I presume, are not very far off from reality today;

(*b*) although the normatives pertain to direct labor only and, at this, net of foundry and forging work, the pertinent labor constitutes about 40 percent of all labor participating in production and "index-wise" might be taken to represent the variations of all effort requirements in variance with the given criteria.

Table C–2 presents similar norms for direct foundry labor. This group of labor constitutes about 50–67 percent of all workers in foundries manufacturing castings for machine tools, or some 10–12 percent of all labor needed in manufacture of machine tools.

Table C–3 contains data on actual average inputs of rolled steel, electric power, and coal in current manufacture of some 26 major groups of Soviet machinery. The data are stated in terms of direct inputs, that is, those expended directly for manufacture of a given product, and full expenditures which include the direct as well as indirect. The information is provided primarily for the benefit of those readers that are familiar with such products manufactured in this country and the technology used and thus be able to extend the comparisons beyond the scope of this study.

TABLE C–1.—*Direct labor norms for manufacture of machine tools, net of foundry and forging work*

Weight of machine tool (kilograms)	Number of original parts	Annual output in units: Up to 10 — Direct labor man-hours per— Ton	Up to 10 — 1 original part	20 — Ton	20 — 1 original part	35 — Ton	35 — 1 original part	70 — Ton	70 — 1 original part	100 — Ton	100 — 1 original part	350 — Ton	350 — 1 original part	1,000 — Ton	1,000 — 1 original part	3,000 — Ton	3,000 — 1 original part	5,000 — Ton	5,000 — 1 original part
100	25	489	1.97	398	1.60	338	1.36	275	1.11	246	0.99	203	0.82	175	0.70	147	0.59	135	0.04
	40	587	1.49	479	1.21	409	1.03	335	.83	302	.75	243	.62	210	.53	177	.45	162	.41
	60	685	1.16	558	.95	473	.80	384	.65	345	.59	284	.48	245	.44	206	.35	189	.32
	100	861	.86	700	.70	595	.59	483	.48	434	.43	357	.36	309	.31	260	.26	239	.24
130	25	441	2.35	359	1.91	305	1.63	248	1.32	222	1.19	183	.98	158	.84	133	.71	122	.65
	40	530	1.78	431	1.44	366	1.23	297	1.00	267	.90	220	.74	189	.64	159	.53	146	.49
	60	618	1.39	502	1.13	427	.96	347	.78	311	.70	256	.58	221	.50	186	.42	171	.38
	100	777	1.03	632	.83	537	.71	436	.58	392	.52	322	.43	278	.37	234	.31	215	.28
150	50	550	1.69	447	1.37	380	1.17	308	.95	277	.85	228	.70	197	.60	165	.51	152	.47
	80	666	1.28	545	1.04	460	.88	374	.72	336	.64	276	.53	238	.46	200	.38	184	.35
	130	808	.95	657	.78	558	.66	453	.54	407	.48	335	.40	289	.34	243	.29	223	.26
200	50	494	1.89	402	1.54	342	1.31	277	1.06	249	.95	205	.78	177	.68	149	.57	137	.52
	80	559	1.43	487	1.16	415	.99	337	.80	303	.72	348	.59	214	.51	180	.43	166	.39
	130	726	1.07	590	.87	503	.74	409	.60	367	.54	301	.44	260	.38	218	.32	201	.30
250	50	450	2.23	366	1.81	311	1.54	252	1.25	226	1.12	186	.92	161	.80	135	.67	124	.62
	80	545	1.68	443	1.37	377	1.16	306	.94	275	.85	226	.70	195	.60	164	.51	151	.47
	130	661	1.26	537	1.02	457	.87	371	.71	333	.63	247	.52	236	.45	199	.38	183	.35
350	50	396	2.70	322	2.20	273	1.87	222	1.52	199	1.36	164	1.12	142	.97	119	.81	109	.75
	80	480	2.04	390	1.66	331	1.41	269	1.15	242	1.03	199	.85	172	.73	144	.61	133	.56
	130	581	1.53	473	1.24	402	1.06	326	.86	293	.77	241	.63	208	.55	175	.46	161	.42
450	60	375	2.84	305	2.31	259	1.97	210	1.60	189	1.43	156	1.18	134	1.02	113	.86	104	.79
	100	472	2.10	383	1.71	326	1.45	264	1.18	238	1.06	196	.87	169	.75	142	.63	130	.58
	150	552	1.65	449	1.34	381	1.14	310	.92	278	.83	229	.68	197	.59	166	.50	153	.46
	200	610	1.37	497	1.11	421	.94	342	.77	307	.69	252	.57	219	.49	184	.41	169	.38
550	60	347	3.27	282	2.66	239	2.26	194	1.83	175	1.65	144	1.36	124	1.17	104	.98	96	.90
	100	436	2.41	354	1.96	301	1.67	244	1.35	220	1.12	181	1.00	156	.86	131	.73	120	.67
	150	510	1.89	415	1.54	352	1.31	286	1.06	257	.95	211	.79	182	.68	153	.57	141	.52
	200	564	1.57	459	1.28	390	1.08	317	.88	284	.79	234	.65	202	.56	170	.47	156	.43
	350	713	1.16	580	.94	493	.80	400	.65	359	.59	296	.48	255	.42	214	.35	197	.32
700	80	360	3.17	293	2.57	249	2.19	202	1.78	181	1.60	149	1.31	129	1.13	108	.95	100	.88
	130	437	2.37	355	1.93	302	1.64	245	1.33	220	1.19	181	.98	156	.85	131	.71	121	.65
	200	513	1.80	417	1.46	355	1.24	288	1.01	259	.91	213	.75	184	.64	154	.54	142	.50
	350	648	1.33	527	1.08	448	.92	364	.75	327	.67	269	.55	232	.48	195	.40	179	.37
900	80	324	3.68	263	2.99	224	2.54	182	2.06	163	1.85	134	1.52	116	1.32	97	1.11	90	1.02
	130	393	2.75	319	2.24	272	1.90	220	1.54	198	1.39	163	1.14	141	.98	118	.83	109	.76
	200	462	1.81	375	1.47	321	1.25	261	1.02	235	.91	191	.75	165	.65	139	.55	128	.50
	350	583	1.34	474	1.09	403	.93	327	.75	294	.68	241	.56	209	.48	175	.40	161	.37
	550	697	1.01	566	.82	481	.70	391	.56	351	.51	289	.42	249	.36	210	.30	193	.28
	700	770	.88	626	.71	532	.61	432	.49	388	.44	319	.36	275	.31	232	.26	213	.24

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TABLE C-1.—*Direct labor norms for manufacture of machine tools, net of foundry and forging work*—Continued

Weight of machine tool (kilograms)	Number of original parts	Annual output in units: Up to 10		20		35		70		100		350		1,000		3,000		5,000	
		Direct labor man-hours per—																	
		Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part
1,200	80	291	4.29	237	3.49	201	2.96	163	2.41	147	2.16	121	1.78	104	1.53	88	1.29	81	1.19
	130	353	3.21	287	2.61	244	2.22	198	1.80	178	1.62	147	1.33	126	1.15	106	.97	98	.89
	200	415	2.44	338	1.98	287	1.69	233	1.37	209	1.23	172	1.01	149	.87	125	.73	115	.67
	350	524	1.81	426	1.47	362	1.25	294	1.01	264	.91	217	.75	188	.65	158	.54	145	.50
	550	625	1.35	508	1.10	432	.94	251	.76	315	.68	259	.56	224	.48	188	.41	173	.37
	900	764	1.01	621	.82	528	.70	429	.57	385	.51	316	.42	273	.36	230	.30	211	.28
	1,500	935	.74	760	.60	646	.51	525	.42	471	.37	388	.31	335	.27	281	.22	259	.21
1,500	150	341	3.43	278	2.79	236	2.37	191	1.93	172	1.73	142	1.42	122	1.23	103	1.03	94	.95
	250	418	2.52	340	2.05	289	1.74	234	1.41	210	1.27	173	1.04	149	.90	126	.76	115	.70
	450	527	1.77	428	1.44	364	1.23	296	.99	266	.89	181	.74	189	.63	159	.53	146	.49
	700	630	1.38	512	1.12	435	.95	353	.77	317	.70	261	.57	225	.49	189	.41	174	.38
	1,200	782	.98	636	.80	541	.68	439	.55	394	.49	324	.41	280	.35	235	.29	216	.27
	1,500	858	.86	692	.70	589	.60	478	.49	429	.44	353	.36	305	.31	256	.26	235	.24
2,500	150	278	4.63	226	3.76	192	3.25	156	2.60	140	2.33	115	1.92	99	1.66	84	1.37	77	1.28
	250	340	3.39	277	2.76	236	2.35	191	1.90	172	1.71	141	1.41	122	1.21	102	1.02	94	.94
	450	429	2.39	349	1.94	297	1.65	241	1.34	216	1.20	178	.99	154	.85	129	.72	119	.66
	700	513	1.86	417	1.51	355	1.28	288	1.04	259	.94	213	.77	184	.66	154	.56	142	.51
	1,200	637	1.32	518	1.07	440	.91	358	.74	321	.66	264	.55	228	.47	192	.40	176	.36
	2,000	778	.98	632	.80	537	.68	436	.55	392	.49	322	.41	278	.35	234	.29	215	.27
3,500	200	269	4.70	219	3.83	186	3.20	151	2.64	136	2.37	112	1.95	96	1.68	81	1.42	74	1.30
	350	341	3.41	277	2.77	235	2.36	191	1.91	172	1.72	141	1.41	122	1.22	102	1.03	94	.94
	550	407	2.61	331	2.12	281	1.80	228	1.46	205	1.32	169	1.08	146	.93	122	.79	112	.72
	900	496	1.95	403	1.58	343	1.35	278	1.09	250	.98	206	.81	177	.70	149	.59	137	.57
	1,500	607	1.43	494	1.16	422	.99	343	.80	305	.72	252	.59	217	.51	183	.43	168	.40
	2,000	681	1.20	554	.98	471	.83	382	.67	288	.61	282	.50	244	.43	205	.36	188	.33
4,500	200	243	5.46	197	4.44	167	3.77	135	3.06	121	2.75	100	1.26	86	1.95	72	1.64	66	1.51
	350	306	4.04	249	3.28	212	2.79	172	2.27	154	2.04	127	1.67	110	1.44	92	1.22	85	1.12
	550	365	3.03	298	2.46	253	2.09	205	1.70	185	1.53	154	1.26	133	1.08	112	.91	103	.84
	900	447	2.26	363	1.84	309	1.56	254	1.27	225	1.14	185	.94	160	.81	134	.68	124	.62
	1,500	547	1.66	445	1.35	378	1.15	307	.93	276	.84	227	.69	196	.59	164	.50	151	.46
	2,500	670	1.20	545	.98	463	.83	376	.67	338	.61	278	.50	240	.43	202	.36	185	.33
5,500	200	224	6.16	182	5.01	155	4.25	126	3.	45113	3.10	93	2.55	80	2.20	67	1.85	62	1.70
	350	283	4.56	230	3.70	195	3.15	159	2.56	143	2.30	117	1.89	101	1.63	85	1.37	78	1.26
	550	338	3.42	275	2.78	233	2.36	189	1.92	170	1.72	140	1.42	121	1.22	102	1.03	93	.94
	900	412	2.55	335	2.07	285	1.76	231	1.43	208	1.29	171	1.06	148	9.91	124	.77	114	.70
	1,500	505	1.87	410	1.52	349	1.29	283	1.05	254	.94	209	.78	181	.67	152	.56	140	.52
	2,500	619	1.36	503	1.10	428	.94	347	.76	312	.68	257	.56	221	.49	186	.41	171	.38

7,000	200	203	7.09	165	5.76	140	4.90	114	3.98	102	3.57	84	2.94	73	2.53	61	2.13	56	1.96
	350	256	5.24	208	4.26	177	3.62	144	2.94	129	2.64	106	2.17	92	1.88	77	1.58	71	1.45
	550	306	3.93	249	3.20	212	2.72	172	2.21	154	1.98	127	1.63	110	1.41	92	1.18	85	1.09
	900	374	2.93	304	2.39	258	2.03	210	1.65	188	1.48	155	1.22	134	1.05	112	.88	103	.81
	1,500	457	2.15	372	1.75	316	1.49	257	1.21	231	1.09	190	.89	164	.77	138	.65	126	.60
	2,500	561	1.56	456	1.27	387	1.08	315	.88	283	.79	232	.65	201	.56	169	.47	155	.43
9,000	200	184	8.25	150	6.71	127	5.70	103	4.63	93	4.16	76	3.42	66	2.95	55	2.48	51	2.28
	350	230	5.98	189	4.86	161	4.13	131	3.35	117	3.01	96	2.48	82	2.14	69	1.80	63	1.65
	550	278	4.58	226	3.72	192	3.16	156	2.57	140	2.31	115	1.90	99	1.64	84	1.38	77	1.27
	900	339	3.42	276	2.78	235	2.36	190	1.92	171	1.72	141	1.42	121	1.22	102	1.03	94	.94
	1,500	415	2.51	338	2.04	287	1.73	233	1.41	209	1.26	172	1.04	149	.90	125	.75	115	.69
	2,500	509	1.82	414	1.48	352	1.26	286	1.02	257	.92	211	.75	182	.65	153	.55	141	.50
12,000	250	180	8.69	147	7.07	125	6.01	101	4.87	91	4.38	75	3.60	65	3.11	54	2.61	50	2.40
	450	227	6.12	185	4.97	157	4.23	128	3.43	115	3.08	94	2.54	81	2.19	68	1.84	63	1.69
	700	272	4.76	221	3.87	188	3.29	153	2.67	137	2.40	113	1.97	97	1.70	82	1.43	75	1.31
	1,200	338	3.37	275	2.74	234	2.33	190	1.89	170	1.70	140	1.40	121	1.20	102	1.03	93	.93
	2,000	412	2.51	335	2.04	285	1.73	231	1.41	208	1.26	171	1.04	148	.90	124	.75	114	.69
	3,500	516	1.79	419	1.46	256	1.24	289	1.01	260	.90	214	.74	184	.64	155	.54	143	.50
15,000	250	166	9.92	135	8.07	115	6.86	93	5.57	84	5.00	69	4.11	59	3.55	50	2.99	46	2.74
	450	210	6.99	171	5.69	145	4.83	118	3.92	106	3.52	87	2.90	75	2.50	63	2.10	58	1.93
	700	251	5.43	204	4.42	173	3.75	141	3.05	126	2.74	104	2.25	90	1.94	75	1.63	69	1.50
	1,200	311	3.85	253	3.13	215	2.66	175	2.16	157	1.94	129	1.60	111	1.38	94	1.16	86	1.06
	2,000	380	2.86	309	2.33	263	1.98	213	1.61	192	1.44	158	1.19	136	1.02	114	.86	105	.79
	3,500	475	2.05	386	1.67	329	1.42	267	1.15	240	1.03	197	.85	170	.73	143	.62	131	.57
20,000	250	147	11.83	119	9.62	102	8.17	82	6.64	74	5.96	61	4.90	53	4.23	44	3.56	41	3.27
	450	185	8.33	151	6.77	128	5.75	104	4.67	93	4.20	77	3.45	66	2.98	56	2.50	51	2.30
	700	221	6.47	180	5.26	153	4.47	124	3.63	112	3.26	92	2.68	79	2.32	67	1.95	61	1.79
	1,200	288	4.59	224	3.73	199	3.17	161	2.58	145	2.31	119	1.90	103	1.64	86	1.38	79	1.27
	2,000	336	3.41	273	2.78	232	2.36	188	1.91	168	1.72	138	1.42	119	1.22	100	1.03	92	0.94
	3,500	420	2.44	341	1.99	290	1.69	135	1.37	212	1.23	174	1.01	150	.87	126	.73	116	.67
	4,500	465	2.09	378	1.70	321	1.44	261	1.17	233	1.05	192	.87	165	.75	139	.63	128	.58
25,000	250	137	13.50	111	10.98	94	9.33	77	7.57										
	450	172	9.50	140	7.73	119	6.57	97	5.33										
	700	206	7.39	167	6.01	142	6.11	116	4.14										
	1,200	256	5.24	208	4.26	177	3.62	144	2.94										
	2,000	312	3.90	254	3.17	216	2.69	175	2.19										
	3,500	390	2.79	317	2.27	270	1.93	219	1.56										
	4,500	432	2.38	351	1.94	299	1.65	243	1.34										
35,000	450	146	11.64	119	9.46	101	8.04	82	6.53										
	700	175	9.05	142	7.36	121	6.25	98	5.08										
	1,200	217	6.42	177	5.22	150	4.43	122	3.60										
	2,000	265	4.77	216	3.88	183	3.30	149	2.68										
	3,500	331	3.41	269	2.78	229	2.36	186	1.91										
	4,500	367	2.92	299	2.37	225	2.02	207	1.64										
45,000	450	137	13.54	111	11.01	94	9.36	77	7.59										
	700	163	10.53	133	8.56	113	7.27	92	5.90										
	1,200	203	7.46	165	6.07	140	5.16	114	4.19										
	2,000	247	5.55	201	4.51	171	3.84	139	3.11										
	3,500	309	3.97	251	3.23	214	2.74	174	2.23										
	5,500	371	2.97	302	2.41	257	2.05	208	1.66										
55,000	450	124	15.28	100	12.42	85	10.56	69	8.57										
	700	148	11.88	120	9.66	102	8.21	83	6.66										
	1,200	183	8.42	149	6.85	127	5.82	103	4.72										
	2,000	224	6.26	182	5.09	155	4.33	125	3.51										
	3,500	280	4.48	228	3.64	193	3.10	157	2.51										
	5,500	336	3.35	273	4.72	232	2.31	188	1.88										

TABLE C-1.—*Direct labor norms for manufacture of machine tools, net of foundry and forging work*—Continued

Weight of machine tool (kilograms)	Number of original parts	Annual output in units: Up to 10		20		35		70		100		350		1,000		3,000		5,000	
		Direct labor man-hours per—																	
		Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part	Ton	1 original part
70,000	700	136	13.71	111	11.14	94	9.47	76	7.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1,200	169	9.72	137	7.90	117	6.72	95	5.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,000	206	7.23	168	5.88	143	4.99	116	4.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3,500	258	5.17	210	4.20	178	3.57	145	2.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	5,500	309	3.85	251	3.14	214	2.67	174	2.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
90,000	700	120	15.93	98	12.95	83	11.01	68	6.94	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1,200	150	11.30	122	9.18	103	7.81	84	6.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,000	183	8.40	148	6.83	126	5.80	102	4.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3,500	228	6.01	186	4.89	158	4.15	128	3.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	5,500	274	4.49	223	3.65	189	3.10	154	2.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	302	3.91	245	3.18	209	2.70	169	2.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
120,000	900	220	16.35	98	13.30	83	11.30	67	9.17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1,500	147	12.00	120	9.76	102	8.30	83	6.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,500	180	8.70	147	7.70	125	6.01	101	4.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4,500	229	6.18	186	5.02	158	4.27	128	3.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	273	4.70	222	3.82	188	3.25	153	2.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
150,000	1,200	127	15.37	102	12.48	87	10.62	70	8.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,000	153	11.43	125	9.29	106	7.90	86	6.41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3,500	191	8.18	156	6.65	132	5.65	107	4.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	5,500	230	6.11	187	4.97	159	4.22	129	3.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9,000	280	4.53	227	3.48	193	3.13	157	2.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
200,000	1,500	121	16.24	98	13.20	83	11.22	68	9.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,500	148	11.77	121	9.57	102	8.13	83	6.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4,000	188	8.36	153	6.79	130	5.77	105	4.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	224	6.36	182	5.17	155	4.39	126	3.57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9,000	248	5.41	201	4.40	171	3.74	139	3.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
250,000	1,500	110	18.45	90	15.00	76	12.75	62	10.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,500	135	13.37	110	10.87	93	9.24	76	7.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4,500	171	9.49	139	7.72	118	6.56	96	5.32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	204	7.22	166	5.87	141	4.99	115	4.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9,000	226	6.15	184	5.00	156	4.25	127	3.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
350,000	1,500	95	22.60	77	18.37	65	15.62	53	12.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,500	116	16.37	94	13.31	80	11.32	65	9.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4,500	147	11.63	119	9.45	102	8.03	82	6.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	175	8.84	143	7.19	121	6.11	98	4.96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9,000	194	7.53	157	6.12	134	5.21	109	5.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
450,000	1,500	89	26.27	73	21.36	62	18.15	50	14.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2,500	110	19.03	89	15.48	76	13.15	61	10.68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4,500	139	13.51	113	10.99	96	9.34	78	7.58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7,000	166	10.28	135	8.36	114	7.10	93	5.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9,000	183	8.76	149	7.12	126	6.05	102	4.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Source: Davydovskii, pp. 287-305.

TABLE C–2.—*Direct labor norms for production of castings for manufacture of machine tools*

Weight of machine tool in kilograms	Number of cast parts	Annual output of machine tools (units)								
		2	6	17	40	110	300	900	2,700	6,500
		Direct labor man-hours per ton of casting								
100	5	230	185	151	127	103	84	68	55	46
	10	245	197	161	135	110	90	73	59	49
	16	285	207	169	142	116	95	77	62	51
160	5	201	161	131	110	90	74	60	48	40
	10	214	172	140	118	96	79	64	52	43
	16	225	181	147	124	101	83	67	54	45
250	10	186	150	122	103	84	68	55	45	37
	16	196	157	128	108	88	72	58	47	39
	25	205	165	134	113	92	75	61	49	41
	40	215	173	141	118	36	79	64	52	43
350	10	169	136	111	93	77	62	50	41	34
	16	177	143	116	98	81	65	53	43	35
	25	186	149	122	102	85	68	55	45	37
	40	194	156	127	107	89	71	58	47	39
500	10	152	122	99	84	69	56	45	37	30
	16	160	128	104	88	73	59	47	38	32
	25	167	134	110	92	76	61	50	40	33
	40	175	141	115	96	80	64	52	42	35
	65	184	148	121	102	84	68	55	54	37
	100	192	154	126	106	88	71	57	46	38
700	16	145	116	94	79	65	53	43	34	28
	25	151	121	99	83	68	55	45	36	30
	40	158	127	103	87	71	58	47	38	31
	65	166	133	109	92	75	61	49	40	33
	100	173	139	114	95	78	64	52	42	35
830	16	136	109	89	75	61	50	40	33	27
	25	143	115	93	79	64	52	42	24	28
	40	149	120	98	82	67	55	44	36	30
	65	157	126	103	87	71	58	47	38	31
	100	164	132	107	90	74	60	49	39	33
1,000	16	130	104	85	71	58	48	39	31	26
	25	136	109	89	75	61	50	40	33	27
	40	142	114	93	78	64	52	42	34	28
	65	150	120	98	83	57	55	45	36	30
	100	156	126	102	86	70	67	46	38	31
	160	164	132	107	90	74	60	49	39	33
1,300	25	125	101	82	69	56	46	37	30	25
	40	131	105	86	72	59	48	39	32	26
	65	138	111	91	76	62	51	41	33	28
	100	144	116	94	79	35	53	43	34	28
	160	151	122	99	83	68	56	45	36	30
1,600	25	118	95	77	65	53	43	35	28	24
	40	123	99	81	68	55	45	37	30	25
	65	130	105	85	72	58	48	39	31	26
	100	136	109	89	75	61	50	40	33	27
	160	142	114	93	78	64	52	42	34	28
2,000	25	110	88	72	60	49	40	33	26	22
	40	115	92	75	63	52	42	34	28	23
	65	121	97	79	67	54	44	36	29	24
	100	126	101	73	69	57	46	38	20	25
	160	132	106	87	73	60	49	39	32	26
3,000	40	102	82	67	56	46	38	30	25	20
	65	108	87	71	59	48	40	32	26	22
	100	112	90	74	62	51	41	33	27	22
	160	118	95	77	65	53	43	35	28	24
	250	124	99	81	68	56	45	37	30	25
	400	129	104	85	71	58	48	38	31	26
4,250	40	91	73	60	50	42	34	27	22	18
	65	96	77	63	53	44	35	29	23	19
	100	100	81	66	55	46	37	30	24	20
	160	105	85	69	58	48	39	31	25	21
	250	110	89	72	61	50	41	33	27	22
	100	115	93	76	64	53	42	34	28	23
5,000	40	87	70	57	48	40	32	26	31	17
	65	92	74	60	51	42	34	27	22	18
	100	96	77	63	53	44	35	29	23	29
	160	101	81	66	56	46	37	30	24	20
	250	106	85	69	58	48	39	31	25	21
	400	111	89	72	61	50	41	33	27	22

TABLE C–2.—*Direct labor norms for production of castings for manufacture of machine tools*—Continued

Weight of machine tool in kilograms	Number of cast parts	Annual output of machine tools (units)								
		2	6	17	40	110	300	900	2,700	6,500
		Direct labor man-hours per ton of casting								
6,000	40	83	67	54	46	38	30	20	20	16
	65	87	70	57	48	40	32	26	21	17
	100	91	73	60	50	41	33	27	22	18
	160	95	77	63	53	44	35	28	23	19
	250	100	80	66	55	46	37	30	24	20
	400	105	84	69	58	48	38	31	25	21
8,500	65	79	64	52	44	36	29	24	19	16
	100	82	66	54	45	38	30	25	20	16
	160	86	70	57	48	39	32	26	21	17
	250	91	73	59	50	41	33	27	22	18
	400	95	76	92	52	43	35	28	23	19
	650	99	80	65	55	45	36	30	24	20
10,000	100	73	63	52	43	35	29	23	19	16
	160	87	67	54	46	37	30	25	20	17
	250	70	70	67	48	39	32	26	21	17
	400	91	73	59	50	41	33	27	22	18
	650	95	76	62	52	43	35	28	23	19
17,500	100	75	60	49	41	34	28	22	18	15
	160	79	63	52	43	35	29	23	19	16
	250	88	66	54	45	37	30	25	20	16
	400	86	69	57	49	39	32	26	21	17
	650	90	73	59	50	41	33	27	22	18
30,000	100	71	57	47	39	32	-------	-------	-------	-------
	160	75	60	49	41	34	-------	-------	-------	-------
	250	78	63	51	43	35	-------	-------	-------	-------
	400	82	66	54	45	37	-------	-------	-------	-------
	650	86	69	56	47	39	-------	-------	-------	-------
50,000	100	68	54	44	37	30	-------	-------	-------	-------
	160	71	57	47	39	32	-------	-------	-------	-------
	250	75	60	49	41	34	-------	-------	-------	-------
	400	78	63	51	43	35	-------	-------	-------	-------
	650	82	66	54	45	37	-------	-------	-------	-------

Weight of machine tool in kilograms	Number of cast parts	Annual output of machine tools (units)								
		2	3	6	10	17	28	40	65	110
		Direct labor man-hours per ton of casting								
80,000	160	68	65	54	49	44	40	37	34	21
	250	71	68	57	52	46	42	39	35	32
	400	74	71	59	54	48	44	41	37	34
	650	78	75	62	56	51	46	43	39	35
125,000	160	65	62	52	47	42	39	36	32	30
	250	67	65	55	49	45	40	37	34	31
	400	71	68	57	52	47	42	39	36	32
	650	74	72	60	54	49	44	41	37	34
175,000	160	62	60	50	45	41	37	34	31	28
	250	65	63	52	47	43	29	36	33	30
	400	68	65	55	50	45	41	37	34	31
	650	71	69	57	52	47	42	39	36	33
300,000	250	62	60	50	45	41	37	34	31	28
	400	65	63	52	47	43	39	36	33	30
	650	68	66	55	50	45	41	38	34	31
	1,000	71	69	57	52	47	42	39	36	33
500,000	250	59	56	47	43	38	45	32	29	27
	400	61	59	49	45	40	36	34	31	28
	650	64	62	52	47	42	38	75	32	29
	1,000	67	64	54	49	44	40	37	34	31

Source: Davydovskii, pp. 302–305.

TABLE C–3.—*Coefficients of direct and full expenditures of steel rolled mill products, electric power and coal in the production of industrial goods*

[Calculated on the basis of 1959 official inter-industry matrix in physical units of measure]

	Unit of measurement	Direct expenditures	Full expenditures	Ratio of full expenditures to direct expenditures
Expenditures of steel rolled mill products on:				
Main line electric locomotives	Tons/unit	119.7	156.5	1.3
Main line diesel locomotives	do	95.8	122.5	1.3
Main line passenger cars	do	36.8	45.3	1.2
Boring and drilling installations (oil)	Tons/set	31.2	85.2	2.7
Main line freight cars	Tons/unit	17.2	20.5	1.2
Excavators	do	12.1	16.4	1.4
Coal combines	do	7.4	9.6	1.3
Trolley buses	do	5.2	7.6	1.5
Steam boilers (except heating boilers)	Tons per ton of steam per hour.	4.8	9.8	2.0
Automobile loaders	Tons/piece	4.5	5.9	1.3
Grain combines	do	4.0	6.3	1.6
Scrapers	do	4.0	9.4	2.4
Forging machines and presses (except manually operated machines and shears).	do	3.5	4.5	1.3
Autobuses	do	2.8	3.8	1.3
Tractors	do	2.6	3.8	1.5
Motor trucks	do	2.3	3.6	1.5
Power transformers	Tons/thousand kilowatt amperes.	2.2	3.2	1.5
Bulldozers	Tons/unit	1.9	5.9	3.1
Compressors	do	1.2	2.2	1.8
Steel pipes of all kinds	Tons per ton	1.1	1.3	1.2
Wire nails	do	1.0	1.2	1.2
Wire, common	do	1.0	1.2	1.2
Steel rope and wire	Tons/ton	1.0	1.2	1.2
Passenger automobiles	Tons/unit	1.0	1.7	1.7
Machinery, equipment and spare parts for the cement industry.	Tons/ton	1.0	1.2	1.2
Oil well installations and equipment	do	1.0	1.3	1.4
Diesel engines	Tons/unit	.9	1.5	1.8
Metal cutting machine tools	do	.9	2.0	2.3
Metal cutting tools	Tons/thousand rubles	.8	1.1	1.4
Bearings, ball and roller, new	Tons/thousands	.7	1.4	1.9
Electric apparatus, high voltage and low voltage.	Tons/thousand rubles	.5	.9	1.7
Grinding and pulverizing equipment	Tons/ton	.6	.7	1.2
Blast-furnace and steel mill equipment	do	.4	.5	1.2
Looms	Tons/unit	.4	.8	2.3
Woodworking machine tools	do	.4	.6	1.6
Refrigerating installations	Tons/set	.2	.6	2.5
Automation means and equipment	Tons/thousand rubles	.2	.3	1.6
Expenditures of electric power on:				
Electric ferroalloys	Kilowatt-hours/ton	4,374	6,259	1.4
Motor trucks	Kilowatt-hours per unit.	1,750	5,309	3.0
Passenger automobiles	do	1,679	3,898	2.3
Refractories	Kilowatt-hours per ton.	626	681	1.1
Steel	do	50	283	5.7
Window glass	Kilowatt-hours per 1,000 square meters.	438	980	2.2
Coal	Kilowatt-hours per ton.	19.8	23.1	1.2
Main line electric locomotives	Thousands of kilowatt-hours per unit.	286.5	552.5	1.9
Main line diesel locomotives	do	103.9	235.9	2.3
Boring and drilling installations	Thousands of kilowatt-hours per set.	11.2	183.8	16.4
Excavators	Thousands of kilowatt-hours per unit.	10.4	26.9	2.6
Diesel engines	do	8.5	12.8	1.5
Building faience and semiporcelain	Thousands of kilowatt hours per thousand units.	7.9	10.0	1.3
Main line freight cars	Thousands of kilowatt hours per unit.	7.4	18.1	2.4
Foundry equipment	do	3.8	6.3	1.7
Metal cutting machine tools	do	3.3	6.8	2.0
Compressors	do	2.1	5.0	2.4
Looms	do	2.0	3.4	1.7
Scrapers	do	1.9	14.7	7.9

TABLE C–3.—*Coefficients of direct and full expenditures of steel rolled mill products, electric power and coal in the production of industrial goods*—Con.

[Calculated on the basis of 1959 official inter-industry matrix in physical units of measure]

	Unit of measurement	Direct expenditures	Full expenditures	Ratio of full expenditures to direct expenditures
Expenditures of electric power on—Continued				
Ethyl alcohol, rectified	Thousands of kilowatt hours per thousand of decaliters.	1.6	2.7	1.7
Metal cutting tools	Thousands of kilowatt hours per thousand rubles.	1.3	2.2	1.7
Expenditures of coal for:				
Coke	Kilogram/ton	1,434	1,526	1.1
Electric power	Kilogram/thousand kilowatt hours.	526	587	1.1
Refractories	Kilogram/ton	86	514	6.0
Cement	do	135	147	1.1
Window glass	Kilogram/thousand square meters.	5,244	6,206	1.2
Pig iron	Kilogram/ton	29	1,412	48.7
Steel	do	42	1,018	24.5
Ferrous rolling mill products	do	48	1,464	30.7
Electric ferroalloys	do	69	3,760	54.7
Sugar, granulated	do	739	955	1.3
Synthetic fibers	Ton/ton	18.1	24.7	1.4
Ethyl alcohol, rectified	Ton/thousand decaliters.	13.9	16.4	1.2
Building (structural) faience and semiporcelain.	Ton/thousand pieces	7.3	13.8	1.9
Foundry equipment	Ton/piece	4.8	14.1	2.9
Artificial fibers	Ton/ton	4.7	10.2	2.2
Wool fabrics, finished	Ton/thousand square meters.	1.5	3.2	2.1
Motor trucks	Ton/piece	1.4	10.1	7.2
Rolling mill equipment	Ton/ton	.5	3.0	5.9

Source: Narodnoe Khoziaistvo, 1960, pp. 149–151.

APPENDIX D. A SYNOPSIS OF 25 MAJOR TECHNOLOGICAL INNOVATIONS CURRENTLY IN THE PROCESS OF DIFFUSION IN SOVIET MACHINE BUILDING INDUSTRY COMPARED TO THE RESPECTIVE TRENDS IN THE UNITED STATES

NOTE.—In such a large industrial sector as machine building, improvements in production techniques are a continuous process whether in United States or U.S.S.R. In fact, a casual perusal of such industrial periodicals as American Machinist, Metalworking Magazine, Automation Magazine, Foundry, and others for United States, and Vestnik Mashinostroeniia, Liteinoe Proizvodstvo, Stanki i Instrument, and others for U.S.S.R., suggests that innovations are virtually an everyday occurrence. A closer analysis of the data will reveal, however, that most of them are small, their overall economic effectiveness relatively insignificant, and/or the process of their diffusion very slow.

The 25 innovations entailed in the synopsis are regarded to be the "pillars" of technological progress of machine building in both U.S.S.R. and United States because either of their great actual or potential economic effectiveness, wide scope of applicability, or the importance of the area of their applicability. The innovations are listed in order of the conventionally defined processes, such as casting, forging, stamping, and so forth, to which they pertain. The part devoted to the Soviet developments contains the descriptions of the innovations and the areas of their applicability, some data on the economic effectiveness the Soviets claim they generate, and a general evaluation of the progress in their diffusion achieved thus far. The U.S. data reflect only on the extent to which the respective innovations have been adopted in this country. The data on the effectiveness of the innovations in the U.S. industry are very scarce, but a few that are available suggest that at least directionwise the economic effects are similar to those in U.S.S.R.

Technological process to which the innovations pertain	U.S.S.R.			Trends in the United States
	Description of innovations and the area of applicability	Major economic effects resulting from the innovations	Extent of diffusion	
Casting	Substitution of mechanical sandslingers for sandpacking by hand in molding and coremaking for large size casting.	(*a*) Saving of labor by about 50 percent; (*b*) Saving of floor space; (*c*) Improved quality of products.	Diffusion is practically limited to the establishments capable of manufacturing their own equipment.	No statistics are available on the use of sandslingers in the United States. The opinion of the foundry industry representatives and technical consultants, however, is that by now the use of sandslingers is rather common in all large and medium size foundries specializing in large castings.
	Substitution of conventional machine molding and machine coremaking for hand molding and hand coremaking in foundries with "batch" type of production.	(*a*) Labor saving by 50 to 60 percent depending on type of machine used and scale of production; (*b*) Considerable floor space saving; (*c*) Improved quality of products.	Slow progress. In 1957 the Soviet foundries had only about 20,000 molding machines, most of which were primitive pre-World War II type. Since then only one plant, Krasnaia Presnia in Moscow, is specializing in production of foundry equipment. The plant has constantly lagged in plan fulfillment.	The number of molding machines in use has declined from roughly 55,000 in 1946 to 40,000 in 1959. About 42 percent of those used in 1959, however, were acquired after 1950 and probably represented as much molding capacity as all molding machines in 1946 because of substantially greater productivity of new machines. The use of conventional coremaking machines has increased by more than 50 percent at the time.
	Application of CO_2 and related processes (chemical hardening of molds and cores before pouring hot metal into molds) in production of medium and large size castings.	(*a*) Shortening of production cycle; (*b*) Elimination of drying ovens; (*c*) Substantial savings of floor space; (*d*) Marked improvements in quality of castings; (*e*) Some labor savings.	Extremely rapid progress. In 1955 the processes were used in production of 220,000 tons of castings, in 1957 for 457,000 tons, and the plan for 1960 called for their use in production of 1,000,000 tons.	Rapid diffusion. By 1959 about 1,165 foundries used the processes, or about 35 percent of the potential. The use of the process is expected to reach the full potential by 1964 or 1965.
	Introduction of resinbonded shell molding and coremaking in place of linseed oil bonded sand molding and coremaking in mass production foundries for castings weighing less than 500 pounds.	(*a*) Labor saving by 70 to 80 percent; (*b*) Floor space savings; (*c*) Fuel savings; (*d*) Improvements in quality of castings; (*e*) Savings of metal; (*f*) Savings in machining of castings.	Slow progress reportedly due to deficient supply of the special equipment needed, deficient supply of thermoreactive resins and deficient supply of small-grain sand presupposed by the method.	The shell method was first introduced in 1951 or 1952. By 1959, 510 foundaries reported using shell molding and 909 foundries, shall coremaking. The 1959 use constituted about 50 percent of the estimated potential. Since then further diffusion of the method has presumably been slowed down, largely because of a new highly competitive innovation—the "hot box" process for manufacture of small cores in mass production foundries.

See footnotes at end of table.

Technological process to which the innovations pertain	U.S.S.R.			Trends in the United States
	Description of innovations and the area of applicability	Major economic effects resulting from the innovations	Extent of diffusion	
Casting	Substitution of (pressure) diecasting for permanent mold and sand mold casting in mass production of nonferrous castings.	(*a*) Labor saving by 50 to 75 percent depending on whether the substitution is for permanent mold or sand molding, respectively; (*b*) Large savings of molding materials and metal; (*c*) Substantial improvement in quality of products; (*d*) Reduction of machining cost; (*e*) Reduction of material handling.	Apparently rapid progress is underway, particularly in foundries producing castings for aircraft and transportation equipment industries.	The number of foundries using diecasting method increased only from 906 in 1946 to 1,124 in 1959, or by 24 percent. But the tonnage output of diecastings at the same time increased by 116 percent, from 381,000 tons in 1946 to 825,000 tons in 1959. Its rapid growth in the future will largely depend on the outcome of the competition between diecast aluminum and sandcast iron engine blocks that has been going on at least since 1957.
	Substitution of semipermanent and permanent mold casting for nonferrous and simple ferrous castings.	(*a*) Labor saving by 30 to 40 percent; (*b*) Savings of molding materials and metal; (*c*) Savings of floor space; (*d*) Improvement of quality of products.	Substantial progress is made, particularly in foundries producing ferrous castings for railroad equipment and metalworking machinery.	The number of foundries using the method increased from 513 in 1946 to 811 in 1959, or 58 percent. The tonnage output increased at the same time by 43 percent, from 272,000 to 390,000 tons. Substantial expansion in the use of permanent mold casting is underway right now because of the industry's switch to this method in the production of railroad car wheels.
	Expanding use of investment (precision) casting, largely lost wax method, for production of small machinery parts from hard to machine alloys, up to about 25 pounds apiece, that normally are machined out of rolled stock or forgings. Used apparently in all sectors of machine building.	(*a*) Savings of labor. The extent of these savings depends on scale of production. At small scales the savings are insignificant, but at large scales, up to 50 to 60 percent; (*b*) Savings in cost of machining. Per each ton of investment castings used in machinery production, about 600 to 800 machine tool hours are saved; (*c*) Savings of metal by about two-thirds.	Of all the recent innovations, the diffusion of investment casting has presumably been fastest. From an output of about 4,000 tons in 1955, it increased to 9,500 in 1956 and the plan for 1957 called for 16,000 tons. In all, the annual need of Soviet economy for investment castings is reported to be about 50,000 tons. To achieve this, several plants have automated the process. Though most of the expansion takes place presumably because of armaments production, there is evidence that the share of civilian sectors is also significant.	The total U.S. output of investment castings in 1958 was only 3,300 tons valued at $37.2 million, or $11,273 per ton. Since 1958 the use of investment castings appears to have grown only insignificantly. The most important deterrents to the use of the castings are believed to be high prices caused by the miniature-size operations (about 150 tons per plant) and low levels of mechanization of the process. Thus far only one plant has reportedly automated the process. A new development, the high energy rate forming, is also likely to deter the use of investment casting from expanding.
	Substitution of hydraulic cleaning chambers for sandblasting and chipping of medium and large size castings.	(*a*) Laborsaving by about 50 percent as compared with sandblasting; (*b*) Radical improvements in work conditions.	Very slow progress. The prototype equipment was designed in late 1940's, but thus far only a few units were built, largely by automotive plants for their own use.	As yet not known to be used in United States. However, at least one manufacturer of foundry equipment is reportedly experimenting with the idea.

	Substitution of airless shotblasting chambers for pneumatic sandblasting in cleaning small and medium size castings.	(a) Laborsaving by 40 to 50 percent... (b) Improvements in work conditions.	Slow progress because of deficient supply of equipment.	Between 1946 and 1959 the number of pneumatic (sandblasting) equipment units is estimated to have declined by about 25 percent, that of airless (shotblasting) chambers increased by 57 percent. However, even in 1959 2,300 U.S. foundries (more than ½ were still using pneumatic sandblasting.
Forging, pressing, upsetting.	Increasing substitution of die forging on mechanical presses for free forging and die forging on forging hammers.	As substitution for free forging: (a) Metal savings by about 40 percent; (b) Savings in cost of machining by about 30 percent; (c) Labor savings by about 50 percent. As substitution for die forging on hammers. (a) Metal saving by 10 to 15 percent; (b) Labor savings by 25 to 40 percent; (c) Savings on dies by 50 to 60 percent.	Slow progress except in mass production and highest priority industries. In latter cases the progress is probably moderate.	In United States the massive switch from free (open die) forging to (closed) die took place during and immediately after World War II. The hammers used in die forging had been almost entirely replaced by presses, mostly mechanical, by about 1953. Since then the trend has been toward multiple action presses in job type forging plants, and high-speed automatic presses, including multiple transfer machines, in production plants. In recent year or two the manufacturers of metal forming equipment have been experimenting with high energy rate forming and numerically controlled machines.
	Increasing use of extrusion and upsetting in manufacture of cylindrical parts, such as small shafts, pins, bolts, nuts, etc., instead of machining the parts from rolled stock or forgings.	(a) Metal savings by 10 to 15 percent; (b) Substantial capital saving. An upsetting machine costing about 3 times the price of automatic chucker, is capable of replacing up to 18 chuckers and using only ⅛ of their floor space; (c) Large laborsaving.	Apparently moderate progress is underway in production of fasteners, but no evidence of progress in production of other parts.	A very rapid progress has been made in last decade or so. The current trend is toward increasingly greater speeds and larger sizes of the extrusion and upsetting machines.
Stamping.....	Application of extra heavy presses for stamping large sections of aircraft bodies and heavy machinery parts instead of riveting small stampings.	(a) Dramatic reduction of production cycle; (b) Marked metal savings; (c) Substantial improvements in quality of products; (d) Large laborsavings.	Substantial progress achieved in recent 2 or 3 years.	For all practical purposes, the 35,000 and 50,000 ton presses manufactured by 1957 are considered more than adequate even today.
	Substitution of automatic coil and strip-feed presses for sheet presses in mass production industries.	(a) Marked metal savings; (b) Large labor savings in stamping; (c) Savings of cost in steel mills because steel rolls are cheaper to manufacture than the steel sheets.	Thus far very little, if any, progress made because, apparently, of deficient supply of the presses.	In United States automatic strip-feeding presses have been used for more than 40 years. In recent years phenomenal progress has been made in adapting the presses to wider strips, thicker gages, and greater speeds. At this time automotive and household appliance industries are already using presses with automatic feeds of steel coils up to 90 inches wide and ¼ inch thick.

See footnotes at end of table.

Technological process to which the innovations pertain	U.S.S.R.			Trends in the United States
	Description of innovations and the area of applicability	Major economic effects resulting from the innovations	Extent of diffusion	
Metal fabrication	Application of electric slag welding instead of riveting and casting in manufacture of thick-walled (up to 350 millimeters) parts for heavy machinery.	(a) Shortening of production cycle by about 50 percent; (b) Savings in cost of machining by up to 30 percent; (c) Metal saving by about 20 percent; (d) Labor saving by 30–50 percent.	Extremely rapid progress has been made to date. First introduced in 1955, but by 1958 over 40 plants had already been experimenting with the method. For 1961 some 200,000 metric tons of steel structures were scheduled to be manufactured by this method.	Electroslag welding in United States is in a very early stage of use and development. First introduced in 1961, there are about 6 installations in use by now. In addition, electrogas welding, a competitive process also introduced in 1961, is used in about 30 installations. The technological know-how in both of them appears to be still limited to certain carbon and low-alloyed steels only.
	Substitution of automatic and semiautomatic welding under carbon dioxide gas shields for conventional electric arc welding.	(a) Savings of electrode rod; (b) Labor saving by 40 to 50 percent; (c) Improved quality of welded seams.	Moderate progress is underway	First introduced 6 or 7 years ago, the method has been rapidly adapted to numerous uses in mass production, including welding of automative "unit bodies." It is estimated that presently about 2 percent of welding filament is performed by the method.
	Expanding use of welded stampings instead of forgings and castings in manufacturing of mass produced parts.	(a) Savings in cost of machining; (b) Savings of floor space; (c) Savings of labor.	Apparently little progress has been made thus far.	Since early 1950's extremely rapid progress is underway in production and semiproduction of parts adaptable to stamping.
Heat treatment	Application of induction electric furnaces in place of oil and coal flame furnaces.	(a) Dramatic shortening of production cycle; (b) Large savings in fuel cost; (c) Capital savings; (d) Improvements in product quality.	Thus far only small progress has been made, largely in automotive and tractor building industries.	The initial use was made in World War II, followed by a phenomenally rapid diffusion in the decade immediately after World War II. The current trend is toward high frequency induction installations with rigid atmosphere controls.
Machining	Increasing use of "flow" production methods employing single-purpose automatic, multistation and transfer machines for essentially "batch" type demand machinery products, such as machine tools, pumps, compressors, heavy diesels, small turbines, etc.	(a) Substantial shortening of production cycle; (b) Savings of capital, particularly on account of savings of floor space and greater extent of equipment utilization; (c) Laborsavings by up to 60 percent.	Rapid progress is underway, particularly in machine tool production. It is claimed that by 1965 70 percent of all machine tools and substantial portions of items in the category of "medium machine building" will be produced by flow methods.	Automatic single-purpose and multistation machines in "batch" production of machinery have been used for quite some time. The transfer machines, however, are known to be used only in plants producing als mass demand products (e.g., heavy diesels along with small diesels, large electric motors along with small ones, etc.). The current U.S. trend in "batch" production is toward numerically controlled machines.

Increasing use of combination (multipurpose) and transfer machines (automatic lines) in mass production industries.	(a) Shortening of production cycle; (b) Substantial capital saving. E.g., 1 4-spindle automatic lathe costing roughly 3 times the price of universal lathe is capable of replacing 44 universal lathes and 1 combination machine is on the average about twice as productive as single-purpose automatic lathe; (c) Substantial laborsaving; (d) With use of combination machines—added flexibility in production.	To date only moderate progress has been reported. It might be expected, however, that in the near future the progress will accelerate. The plan for 1959–65 calls for a total output of 150,000 to 160,000 of special, specialized, and combination machines and about 1,300 automatic lines.	The late 1940's and 1950's had been characteristic of the phenomenally productive and flexible transfer lines built largely from combination machines. There were about 8,600 in-line multistation and transfer machines in use in 1958. (The 2 types are roughly equivalent to the Soviet concept of automatic lines.) The current trend is toward integrated multiprocess transfer lines embracing all or most processes rather than machining alone.
Application of electrical and electrochemical methods of machining for processing parts made of hard-to-machine alloys.	Permits production of items impossible or highly costly to produce by other methods.	Substantial progress achieved to date.	The first electro-erosion and ultrasonic cutting machines were in use more than 10 years ago. The real breakthroughs in the modern electromachining techniques, however, have been made only a year or so ago.
Substitution of numerically controlled for manually controlled machine tools in production of custom (unit) built machines, machines produced in small batches, and in large-scale production requiring frequent changeovers of tooling and setups.	(a) Laborsaving by 30 to 40 percent, depending on functional type of machine; (b) Reduction of labor skill requirements; (c) Capital saving by 20 to 25 percent; (d) High flexibility in production; (e) Possibility of centralized planning and control of processes; (f) Substantially improved quality of products; (g) Possibility of producing products prohibitively expensive to produce by other methods.	Surprisingly slow progress. Though at least two prototype models, one—pont-to-point positioning and the other—continuous path, had been produced by 1959, the plan for 1960 called for only 180 units and that for 1959–65 for only several hundred. The relative meagerness of discussions about the actual experience with their use in the press suggests that the use is presumably still concentrated in the armaments sector.	Numerically controlled (N/C) machine tools is the most important technological innovation in U.S. metalworking sector of the last decade. The industry started experimenting with the idea in late 1940's. The first N/C machines became commercially available to the users around 1954. At the time of the Chicago machine tool show in 1960, however, more than 60 firms were in the business. Since then the number of firms in the business of N/C machine tools has been constantly growing and most of the functional types of machine tools have been adapted to the system. As yet there is no statistics available on the number of the machines in use. The estimates vary from 1,500 to as many as 3,000.
Increasing use of quickly changeable electric, pneumatic and hydraulic jigs and fixtures with all types of machine tools and all types of production.	(a) Appreciable labor savings; (b) Capital savings due to increases in productivity of machines by more than the cost of the devices.	Slow progress due to deficient supply of the jigs and fixtures. Most of these, even the universal ones, are still being manufactured in users' establishments rather than in specialized plants.	Only limited progress has been made since World War II. Unlike in U.S.S.R., the manufacture of jigs and fixtures in United States has developed into a separate industry. In the recent few years several companies have been experimenting with universal "building block type" fixtures.

See footnotes at end of table.

Technological process to which the innovations pertain	U.S.S.R.			Trends in the United States
	Description of innovations and the area of applicability	Major economic effects resulting from the innovations	Extent of diffusion	
Assembly	Increasing application of conveyor-type assembly in production of batch demand machinery, largely for machine tools, pumps and compressors.	(*a*) Shortening of production cycle; (*b*) Substantial labor savings; (*c*) Floor space saving.	As in machining, substantial progress appears to be underway.	As with machining transfer lines, conveyor-type assembly is used for batch type products in plants manufacturing also mass products. In the last few years some progress has been made also in strict batch type plants, including manufacturing of machine tools.
	Increasing application of tilters and universal assembly fixtures in custom and small scale production.	(*a*) Shortening or production cycle; (*b*) Substantial labor savings; (*c*) Floor space saving.	Slow progress	The use of tilting tables is rather common in assembly of batch type machinery. The use of universal assembly fixtures, however, is still limited to a few plants.
Material handling	Increasing use of conveyors and other types of continuous material handling in mass- and batch type production.	(*a*) Dramatic labor savings (*b*) Floor space saving. (*c*) Improved conditions of work.	Progress appears to be limited to instances where continuous material handling is presupposed in the schemes of basic technological equipment, such as supply of sand to index molding machines by means of conveyors, transportation of parts into continuous heat-treatment furnaces, etc.	Though conveyorization is by no means a new development to U.S. machinery producers, the concept still appears to have as strong sales appeal in the industry as ever. The current trend seems to be toward greater application of traditional types of conveyors, such as overhead, belt, roller, etc., in medium and small size establishments, and use of chip conveyors and pneumatic tubes in large plants.

Sources:

U.S.S.R. The information on the innovations in U.S.S.R. is a result of digesting the voluminous discussions on the technological and organizational "reserves" for labor productivity increase in machine building with which the Soviet technocrats have recently flooded the periodic press, pamphlets, and numerous monographs. Usually the same arguments and data appear in several sources. Obviously the data contain much more details than I considered necessary to include in this synopsis. The interested readers will locate all of them while going over:

(*a*) Periodicals, Liteinoe Proizvodstvo, 1958–61; Kuznechno-Shtampovochnoe Proizvodstvo, 1959–61, Vestnik Mashinostroemia, 1958–61; Stanki i Instrument, 1958–61; Svarochnoe Proizvodstvo, 1958–61; and Promyshlenno-Ekonomicheskaia Gazeta. 1958–61;

(*b*) Pamphlets and monographs—Voprosy povysheniia proizvoditel'nosti, Novaia tekhnologiia, Kompleksnaia mekhanizatsiia, Tekhnicheskii Progress, Chernyshev, Emel'ianov, Klimenko, Kuznetsov, Koniushnaia, Omarovskii, Prokopovich, Ganshtak-1, Kurakov, Livshits, Dumler, and Sovremennі ie napravleniia.

United States. The statements on the respective trends in United States are based on the data in:

(*a*) Inventories of foundry equipment conducted by the editors of Foundry, published ibid., March 1957, May 1954, and May 1960.

(*b*) Biannual surveys of foundry industry conducted by Foundry, appearing ibid., and in separate bulletins Marketing Guides to the Metal Casting Industry, 1946–62;

(*c*) Inventories of metalworking equipment conducted by American Machinist, published ibid., November issues 1949, 1953, and 1958;

(*d*) U.S. Bureau of the Census, Current Industrial Reports, series M33A (Iron and Steel Castings), M33E (Nonferrous Castings), M33C (Forgings), M35W (Metal working Machinery:)

(*e*) New Views on Automation;

(*f*) Census of Manufacturers, 1947, 1954, and 1958;

(*g*) Various review articles published in 1958–62 in Foundry, Iron Age, Modern Castings, American Machinist, Metalworking Magazine, Automation Magazine, Metalworking News, Assembly and Fasteners Engineering; and

(*h*) Information obtained in personal interviews with representatives of trade organizations, editors of trade journals, manufacturers of metalworking equipment and suppliers of foundry materials. The U.S. data, too, permit an analysis of the technological trends at much greater detail than has been undertaken in this study.

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THE BALANCE OF PAYMENTS OF THE U.S.S.R., 1959–60

BY

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This paper presents the available information on the transactions of the U.S.S.R. with the countries of the Soviet area [1] and with the rest of the world during 1959–60. It is a continuation of an article published in the March 1962 issue of the International Monetary Fund staff papers,[2] which covered Soviet international transactions for 1955–58. The presentation and methods of estimation used in this paper are the same as those employed in the earlier paper, where they are described in somewhat more detail. All the figures in this paper are in U.S. dollars. On January 1, 1961, the par value rate of the ruble was modified from 1 old ruble = US$0.25 to 1 new ruble= US$1.11. Ruble figures shown in U.S.S.R. sources published after January 1, 1961 are expressed at the new rate, and for the purpose of this paper have been converted into U.S. dollars at that rate.

Table 1 covers the balance of payments of the U.S.S.R., and is divided into two sections: Section I, identified transactions, and section II, unidentified transactions. For some items, both sides [3] of the transactions have been identified; for others, only one side. Where only one side has been identified, the other side is entered in section II. There are undoubtedly instances where both sides of a transaction have been identified (and thus entered in sec. I) but have not been recognized as the two sides of the same transaction. For example, gold may have been sold to finance the trade deficit. In such instances, both sides of the transaction appear in section II as well as section I. Finally, for transactions where neither side has been identified, there are no entries in either section.

Merchandise transactions [4]

Data for Soviet merchandise transactions are derived from statistics in rubles published by the U.S.S.R. Ministry of Foreign Trade. The data have been converted into U.S. dollars at the official exchange rates given above. Goods "supplied as free aid" are excluded from the trade figures. Export figures derived from trade statistics have been adjusted to include identified shipments of military equipment to underdeveloped countries.

Total Soviet foreign trade, i.e., exports plus imports, increased from $8.6 billion in 1958 to $11.2 billion in 1960; 70 percent of the total trade

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[1] As used in this paper, the Soviet area comprises Albania, Bulgaria, mainland China, Czechoslovakia, Eastern Germany, Hungary, North Korea, Outer Mongolia, Poland, Rumania, and North Vietnam.

[2] Vol. IX, pp. 1–36.

[3] The balance of payments is a double-entry system of accounts, in which each transaction is reflected in two entries, which are mutually offsetting. For example, a merchandise export must be matched by an import of goods or services, a transfer payment abroad, a decrease in liabilities, or an increase in foreign assets or gold.

[4] Sources: 16, 40, and 45. (The numbers refer to publications listed in the bibliography.)

in 1960 was with other countries of the Soviet area. Trade with mainland China dropped sharply in 1960, presumably as a result of China's difficulties in fulfilling the trade agreements of previous years. However, as a buyer of Soviet goods, mainland China still ranked second only to Eastern Germany. Among the countries outside the Soviet area, the chief purchasers of Soviet commodities in 1960 were the United Kingdom, Finland, West Germany, Italy, Japan, and Cuba. Russia's total trade with Cuba amounted to $174 million in 1960 as against $7 million in 1959.

Data on Soviet trade by method of financing are given in table 2; the residual item for countries of the Soviet area represents the trade balance after adjustments, which in principle is supposed to be settled through either bilateral or multilateral payments agreements. For countries outside the Soviet area, the residual item represents unidentified transactions. The figures for payments agreements are hypothetical, based on the assumption that trade with countries with which the U.S.S.R. had such agreements was settled through those agreements to the greatest extent possible under the provisions for swing credits or overdrawn swing credits. The residual figures for Soviet trade with the countries of the Soviet area show surpluses of $289.7 million for 1959 and $186.5 million for 1960. Available data for U.S.S.R. trade with countries of the Council of Mutual Economic Assistance (CMEA) [5] show surpluses of $324 million for 1959 and $175.7 million for 1960; however, the trade statistics of Poland and Eastern Germany show figures for Soviet exports to their respective countries that are smaller, by a total of $34.1 million for 1959 and $123.7 million for 1960, than those given in the U.S.S.R. sources. Soviet trade with the Asian countries of the Soviet area, including mainland China, resulted in a deficit of $34.3 million for 1959 and a surplus of $10.8 million for 1960. Trade relationships between the U.S.S.R. and mainland China are covered in a separate section.

Available data on trade with countries outside the Soviet area seem to show a considerable worsening of the Soviet trade balance in 1960. Net payments, either in foreign exchange or through payments agreements, are estimated at $305 million for 1960, against net reecipts of $42.2 million for 1959.

Transactions in invisibles

This group of items covers transactions in invisibles of the Soviet Union with the Soviet area and the rest of the world. A summary of these transactions is presented in table 3.

Freight on international shipments.[6]—In recent years, the U.S.S.R. has built or purchased several new cargo vessels, and its merchant fleet is estimated at 3 million gross register tons, representing 3 percent of world tonnage. Under a 1956–60 plan, the shipping fleet was to be increased from 2.4 to 4 million tons. The Soviet Union has been building extensively in its own shipyards and has also placed orders for ships with shipyards of Soviet area countries and Western countries. In addition, shipping on charter to Soviet area countries has diminished as a result of U.S.S.R. efforts to carry a greater share of

[5] For an explanation of this Council, see Caiola, op. cit.
[6] Sources: 8, 31, and 32.

its imports and exports. Freight carried by Russian ships has been estimated at 33.7 million tons for 1950, 65.7 million tons for 1957, and 75.9 million tons for 1960.

In this paper, it is assumed that Soviet payments for freight on imports from countries outside the Soviet area amounted to 6 percent of imports f.o.b.

Interest on loans extended.—This item covers estimates by the author on interest received by the U.S.S.R. on long-term credits granted to countries of the Soviet area and the rest of the world. The interest rates charged varied from 2 to 2.5 percent; in some cases, the credits were extended free of interest.

Interest on loans received.[7]—The entries for this item cover payments by the U.S.S.R. to the United States ($5.6 million for 1959 and $5.2 million for 1960) on lend-lease aid extended under the pipeline credit agreement of October 15, 1945 to the United Kingdom ($0.2 million for 1959 and also for 1960) under the terms of the December 1947 agreement, and to Sweden ($3 million for 1959 and also for 1960) on loans received in 1946–52.

Transfer payments and other movements of capital

Table 4 summarizes U.S.S.R. transfer payments and other movements of capital, including credits to countries of the Soviet area and the rest of the world.

Contributions to the United Nations and its agencies, and to the U.N. technical assistance program.[8]—Soviet contributions to the United Nations and its specialized agencies and to the U.N. technical assistance program (UNTAP) are given in table 5. Payments were made in U.S. dollars, or other free currencies, except that those to the United Nations Children's Fund (UNICEF) and the UNTAP were made in rubles.

Economic relations with mainland China.[9]—In April 1961, the Governments of the U.S.S.R. and mainland China signed an agreement on the settlement of the Chinese trade deficit to the U.S.S.R. The agreement provided that the trade deficit, which is estimated at $320 million, should be repaid in annual installments of 8 million rubles beginning in 1962. The agreement mentions that Soviet claims originate from China's failure to meet export commitments to the U.S.S.R. in 1960; however, Soviet trade statistics for that year show a favorable balance for China. Hence, it is reasonable to assume that the agreement refers to a cumulative deficit over a period of several years. The quoted figure of $320 million seems to agree with statistics that are available on trade between the two countries. Table 6 shows that the period 1950–60 ended with a Soviet surplus of 1,377 million old rubles, equivalent to $344 million, a figure of roughly the same magnitude as the one covered by the agreement. Trade relations between the two countries show an accumulation of Soviet claims up to the end of 1955; beginning in 1956, Chinese exports were larger than imports. Soviet trade statistics for 1961, which have recently been released, show a sharp decline in Russian trade with mainland China and a balance in favor of China of $182.3 million, presumably intended to reduce the trade deficit.

[7] Sources: 13 and 41.
[8] Sources: 17, 36, 37, 38, 39, and 48.
[9] Sources: 19, 25, 28, 45, and 47.

During 1959–60, the U.S.S.R. did not grant credits to mainland China. In this paper, the entries refer only to repayments by China on the credits received in 1950 and 1954.

Credits to countries of the Soviet area, excluding mainland China.[10]—Long-term credits extended by the U.S.S.R. to countries of the Soviet area are estimated at $116.5 million for 1959 and $543.8 million for 1960. Of the total, $254 million was granted to East European countries and $406.3 million to Asian countries. The new commitments cover loans for economic development and technical assistance. No credits in gold or foreign exchange were extended in 1959 or 1960.

Drawings on credits accorded in previous years are estimated at $203.7 million for 1959 and $248.2 million for 1960. These figures have been estimated by assuming, for economic development loans, that deliveries of material and equipment for complete enterprises, as shown in category 16 of the Russian trade statistics, cover the shipment of commodities financed by credits and that services so financed amounted to an equal value. The figures so derived are not very different from those that could be derived by assuming that drawings were made in equal installments during the period of the agreements.[11] For credits extended to finance Soviet deliveries of consumer goods, as in the case of Poland, it is assumed that drawings were made in equal annual installments during the period of the agreement.

For repayments, it has been assumed that they were made in equal installments during the period of the agreement. Repayments on loans extended by the U.S.S.R. to North Korea are not included in this paper, since they were postponed under the terms of the October 16, 1960, agreement.

Appendix C presents some of the details of the 1960 agreements between the U.S.S.R. and the Soviet area countries, excluding mainland China.

Grants and other assistance to countries of the Soviet area.[12]—In addition to the credits, the U.S.S.R. made a donation equivalent to $5 million to North Vietnam to fight malaria. The grant was made on December 23, 1960, and presumably was not utilized by the end of the year.

On October 13, 1960, the U.S.S.R. canceled a North Korean debt of 760 million rubles arising from previous credits and postponed the repayment of 140 million rubles. The total of 900 million rubles ($225 million) appears high, since identified economic credits to North Korea amounted to $82.5 million as of the date of the above agreement. The difference may possibly represent military aid.

On December 31, 1960, the U.S.S.R. agreed to postpone the repayment of $40 million due by Bulgaria in 1961–63. The agreement was announced on January 1, 1961, together with a credit of $162.5 million for economic development.

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[10] Sources: 3, 6, 9, 18, 22, 27, and 45.

[11] The figures based on the second method are $209.3 million for 1959 and $186.1 million for 1960. The difference for 1960 is almost entirely in respect of Bulgaria, for which the U.S.S.R. trade statistics show large deliveries of equipment and material for complete enterprises.

[12] Sources: 3 and 9.

Economic credits to countries outside the Soviet area.[13]—During 1959 and 1960, the U.S.S.R. continued its policy of assistance to underdeveloped countries by extending economic credits valued at $1.7 billion, an amount equal to total economic assistance by the U.S.S.R. to countries outside the Soviet area from the end of World War II through 1958. Some of the new credits have been granted for specific projects, such as the loan to the United Arab Republic (Egypt) for the Aswan Dam and to Ghana for the Volta project. Other loans have been extended for general economic development and separate protocols have specified the projects to be financed. The period envisaged for the utilization of the new loans varies from 4 to 8 years; the period of repayment is usually 12 years and the interest rate 2.5 percent. Table 7 presents details for 1959 and 1960 on the economic credits extended by the U.S.S.R. to countries outside the Soviet area. Table 9 covers data on commitments, drawings, and repayments on economic loans during the same period.

According to some sources, the loan of $80 million to Afghanistan will be partly granted out of the proceeds of the sales of Russian wheat. The U.S.S.R. shipped some 40,000 tons of wheat to Afghanistan in 1959 and an additional 50,000 tons in 1960. In table 9, data on drawings and repayments are based on official Afghan publications and estimates of the author.

The loan of $100 million to Argentina is reported by the United Nations; other sources mention that in January 1960 the Governments of the U.S.S.R. and Argentina reached an agreement whereby Argentina may use $50 million under the 1958 oil agreement to import commodities other than oil-drilling equipment. According to official Argentine sources, no deliveries have been made under the oil agreement; however, the U.S. Department of State estimates that drawings amounted to $18 million by December 31, 1960. In this paper, the figures for drawings cover the deliveries of oil-drilling equipment, as shown in Russian trade statistics.

The 1960 credit to Cuba was announced at the same time as an agreement on the sale of Cuban sugar to the U.S.S.R. The Soviet Union agreed to purchase 1 million tons of sugar each year for 5 years. Only one-fifth (200,000 tons) will be paid for in U.S. dollars, and the balance will be applied against Cuban purchases in the U.S.S.R. of Soviet products. No data are available on deliveries under the long-term agreement.

Drawings on the loan to Ethiopia cover disbursements of convertible currency in connection with the land reform. The United Nations reports a credit of $100 million to Indonesia in 1959; however, in other sources, the agreement is reported to provide for only $17.5 million, to be utilized by 1962. Soviet sources indicate a loan of $250 million granted to Indonesia in 1960. It is probable that the last total includes the $100 million credit indicated by the United Nations. It is most likely that the negotiations of the loan began in 1959 but that the final agreement was reached in 1960. Some sources mention an additional loan to India in 1959 in connection with the construction of an oil refinery. This loan has not been included because further details are lacking.

[13] Sources: 1, 2, 3, 4, 11, 12, 15, 21, 23, 24, 26, 29, 30, 35, 42, 43, 44, and 45.

The entries for drawings on loans to the United Arab Republic cover the deliveries of material and equipment for complete enterprises, as reported in the Russian trade statistics ($15.7 million for 1959 and $15.8 million for 1960), plus an equal amount for technical assistance. According to UAR sources, drawings on Russian credits amounted to $91.2 million by the end of March 1961; the difference between this amount and that given in table 9 may reflect, at least in part, the amount utilized during the first quarter of 1961.

Drawings on loans to the Syrian Arab Republic cover only the shipment of material and equipment for complete enterprises, as shown in the Russian trade statistics. In addition, Soviet technicians have been very active in Syria, although the value of such assistance cannot by attributed by year. U.S. sources estimate that total drawings amounted to $25 million by the second half of 1960; therefore, the entries in table 9 may be underestimated.

Soviet technical assistance to underdeveloped countries has increased in the last few years. This form of aid has been extended by providing Soviet technicians, operating in the receiving country, and by granting scholarships to students and workers of the less developed countries. Appendixes A and B present some of the details of the agreements.

Military aid to countries outside the Soviet area.[14]—It has been estimated that the U.S.S.R. extended military credits to underdeveloped countries valued at $11 million in 1959 and $373 million in 1960. The aid was granted to Indonesia ($11 million for 1959 and $300 million for 1960), Iraq ($68 million for 1960), Morocco ($4 million for 1960), and the Sudan (less than $500,000). These estimates do not include military credits to Cuba. British sources substantially agree with these estimates. Equipment delivered under the terms of agreements for these and previous years is estimated at $120 million to Iraq in 1959 and $11 million to Indonesia in 1960. The figures quoted above do not include military aid granted by other countries of the Soviet area. In this paper, it is assumed that repayments on military credits extended in previous years were made by the UAR ($31.5 million for 1959 and also for 1960), and by the Syrian Arab Republic $5 million for 1959 and also for 1960).

Grants to countries outside the Soviet area.[15]—Identified grants by the Soviet Union to countries outside the Soviet area cover shipments of wheat to Afghanistan ($2 million for 1959 and $2.5 million for 1960) and Yemen ($0.5 million for 1959), and the construction of a hospital in Cambodia ($0.4 million for 1959 and $1.1 million for 1960), and a technical school in Ethiopia ($1.8 million for 1959). In addition, the U.S.S.R. made other donations, the value of which is not available. Some of these transactions are reported in appendix A and appendix B to this paper.

Credits from the West.[16]—In recent years, the U.S.S.R. has solicited credits from Western countries to help to finance the purchase of industrial equipment. Trading agencies of the Soviet Union have obtained credit facilities from private banks in Western European countries.

[14] Sources: 10, 12, 30, and 43.
[15] Sources: 1, 3, 5, 11, and 46.
[16] Source: 44.

Under the terms of the credits, the Soviet Union pays 20 percent of the cost during the period between the placing of the order and the conclusion of the first tryout of the installation in the U.S.S.R. The remaining 80 percent of the purchase value is paid over a period of 5 to 10 years.

Repayments by the U.S.S.R. on external credits.[17]—This item covers repayments by the U.S.S.R. to the United States ($3.6 million for 1959 and $3.8 million for 1960) on lend-lease aid extended under the pipeline credit agreement of October 15, 1945, and to the United Kingdom ($9.3 million for 1959 and also for 1960) under the terms of the December 1947 agreement. In addition, in August 1960, the U.S.S.R. paid in advance a first installment of $7.1 million on a loan of SKr1 billion, which had been received from Sweden in 1946–52. Repayments were not due until 1961.

Austrian reparations.[18]—Estimates for Austrian reparations are derived from the Austrian balance of payments. The figures cover deliveries of goods to the U.S.S.R. under the terms of the 1955 State Treaty ($47.2 million for 1959 and $41 million for 1960), and deliveries by the U.S.S.R. to Austria under the terms of the 1958 agreement ($8.5 million for 1959 and $10 million for 1960). It is assumed that the deliveries of goods are included in the Soviet figures for imports.

Selected monetary movements

Section I.C of table 1 presents identified changes in the Soviet Union's liabilities in rubles, sales of gold, and other monetary transactions. The entries for liabilities in rubles represent the increases of U.S.S.R. liabilities as a result of contributions to the U.N. technical assistance program and the United Nations Children's Fund. Sales of gold cover shipments of gold to Western countries.[19] Net gold production (i.e., nonmonetary gold) and the offsetting additions to official gold holdings have been omitted from table 1. Other transactions cover Soviet repayments in free exchange on loans received from the United States, the United Kingdom, and Sweden ($12.9 million for 1959 and $20.2 million for 1960), interest payments to the United States and the United Kingdom [20] ($5.8 million for 1959 and $5.4 million for 1960), and payments of contributions to the United Nations and its agencies ($15.4 million for 1959 and $12 million for 1960).

Unidentified transactions

Section II of table 1 covers the offsets to transactions in section I that have no contraentries.[21]

Settlement of trade balances covers the residuals shown in table 2. There is evidence that the trade surplus or deficit of the U.S.S.R. with the Soviet area countries is settled by additional shipments of goods in the following years rather than by payments in free exchange. On the other hand, trade balances with the rest of the world are presumable settled either through payments agreements or in free exchange.

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[17] Sources: 13, 15, 20, 33, 34, and 41.
[18] Source: 15.
[19] Source: 14.
[20] Interest on the loan from Sweden was paid in commodities.
[21] For a description of this section, see Caiola, op. cit., p. 30.

The offset to gold and foreign exchange loans represents cash disbursements or repayments in connection with credits granted by the U.S.S.R. The entry for countries outside the Soviet area covers a free exchange disbursement to Ethiopia; the entries for the countries of the Soviet area are derived from the details shown in table 8. These transactions have either increased (debit) or decreased (credit) holdings of foreign exchange by the U.S.S.R.

TABLE 1.—*U.S.S.R.: Balance of payments, 1959–60* [1]

[In millions of U.S. dollars]

	1959			1960		
	Soviet area	Rest of world	Total	Soviet area	Rest of world	Total
I. IDENTIFIED TRANSACTIONS						
A. Goods and services:						
Exports f.o.b.	4,077.8	1,483.0	5,560.8	4,083.4	1,489.4	5,572.8
Imports, f.o.b.	−3,736.8	−1,336.5	−5,073.3	−3,821.6	−1,807.2	−5,628.8
Services, net	70.6	−63.8	6.8	89.6	−88.3	1.3
Total	411.6	82.7	494.3	351.4	−406.1	−54.7
B. Transfer payments and long-term capital:						
Transfer payments and loans granted	−203.7	−263.0	−466.7	−438.2	−144.9	−583.1
Transfer payments and repayments received	152.6	112.4	265.0	346.7	105.3	452.0
Total	−51.1	−150.6	−201.7	−91.5	−39.6	−131.1
C. Selected monetary movements:						
Liabilities in rubles	----------	3.0	3.0	----------	3.0	3.0
Sales of gold	----------	255.0	255.0	----------	200.0	200.0
Other	----------	34.1	34.1	----------	37.6	37.6
Total	----------	292.1	292.1	----------	240.6	240.6
Total (A through C)	360.5	224.2	584.7	259.9	−205.1	54.8
II. UNIDENTIFIED TRANSACTIONS						
Settlement of trade balances	−289.7	−42.2	−331.9	−186.5	305.0	118.5
Settlement of service balances	−22.0	71.2	49.2	−24.7	98.1	73.4
Offset to gold and foreign exchange loans	−48.8	----------	−48.8	−48.7	2.0	−46.7
Offset to gold sales	----------	−255.0	−255.0	----------	−200.0	−200.0
Other	----------	1.8	1.8	----------	----------	----------
Total	−360.5	−224.2	−584.7	−259.9	205.1	−54.8

[1] No sign indicates credit; minus sign indicates debit.

TABLE 2.—*U.S.S.R.: Merchandise transactions, by area and by method of financing, 1959–60*

[In millions of U.S. dollars]

	1959			1960		
	Soviet area	Rest of world	Total	Soviet area	Rest of world	Total
Exports f.o.b. in trade returns	4,077.8	1,363.0	5,440.8	4,083.4	1,478.4	5,561.8
Identified shipments of arms		120.0	120.0		11.0	11.0
Imports f.o.b. in trade returns	3,736.8	1,336.5	5,073.3	3,821.6	1,807.2	5,628.8
Trade balance	341.0	146.5	487.5	261.8	−317.8	−56.0
Financed through—						
Military credits		120.0	120.0		11.0	11.0
Other Soviet credits	155.1	82.3	237.4	183.3	64.9	248.2
Repayments in goods of Soviet credits	−103.8	−65.2	−169.0	−108.0	−64.3	−172.3
Gifts, reparations, etc. (net)		−32.8	−32.8		−24.4	−24.4
Residual	289.7	42.2	331.9	186.5	−305.0	−118.5
Payments agreements	(289.7)	(−46.1)	(243.6)	(186.5)	(−48.6)	(137.9)
Other	(-----)	(88.3)	(88.3)	(-----)	(−256.4)	(−256.4)

TABLE 3.—*U.S.S.R.: Balance of payments transactions in invisibles, 1959–60* [1]

[In millions of U.S. dollars]

	1959			1960		
	Soviet area	Rest of world	Total	Soviet area	Rest of world	Total
Freight on imports		−80.2	−80.2		−108.4	−108.4
Services under aid programs	48.6	16.2	64.8	64.9	18.2	83.1
Interest on loans extended	22.0	9.0	31.0	24.7	10.3	35.0
Interest on loans received		−8.8	−8.8		−8.4	−8.4
Total	70.6	−63.8	6.8	89.6	−88.3	1.3

[1] No sign indicates credit; minus sign indicates debit.

TABLE 4.—*U.S.S.R.: Transfer payments and other movements of capital, 1959–60*

[In millions of U.S. dollars]

	1959			1960		
	Soviet area	Rest of world	Total	Soviet area	Rest of world	Total
DEBITS						
Participation in U.N. and U.N. agencies and in U.N. Technical Assistance Program		18.4	18.4		15.0	15.0
Cancellation of debts [1]				190.0		190.0
Other grants		4.7	4.7		3.6	3.6
Economic and technical assistance loans	203.7	98.5	302.2	248.2	85.1	333.3
Identified military aid		120.0	120.0		11.0	11.0
Repayments on loans received		12.9	12.9		20.2	20.2
Payments to Austria		8.5	8.5		10.0	10.0
Total	203.7	263.0	466.7	438.2	144.9	583.1
CREDITS						
Austrian reparations		47.2	47.2		41.0	41.0
Cancellation of debts [1]				190.0		190.0
Repayments by Mainland China	43.0		43.0	43.0		43.0
Repayments on military aid		36.5	36.5		36.5	36.5
Other repayments	109.6	28.7	138.3	113.7	27.8	141.5
Total	152.6	112.4	265.0	346.7	105.3	452.0

[1] The entires cover the canellation of Soviet Union claims on North Korea arising from credits granted before 1960. The transaction is recorded in the balance of payments as a decrease in Soviet Union long-term assets (credit) offset by a grant to North Korea (debit).

TABLE 5.—*U.S.S.R.: Contributions to the United Nations and its agencies and to the U.N. technical assistance program, 1959–60* [1]

[In thousands of U.S. dollars]

	1959	1960
U.N. administrative budget	9,267	5,103
Special account of the U.N. Emergency Force	8	245
International Atomic Energy Agency (IAEA)	770	863
International Labor Organization (ILO)	976	1,030
International Telecommunication Union (ITU)	78	78
United Nations Children's Fund (UNICEF)	613	613
United Nations Educational, Scientific, and Cultural Organization (UNESCO)	2,048	2,160
Universal Postal Union (UPU)	20	20
World Health Organization (WHO)	2,234	2,467
World Meteorological Organization (WMO)	38	64
Total	16,052	12,643
United Nations technical assistance program (UNTAP):		
Expanded program	1,175	1,175
Special fund	1,175	1,175
Total	18,402	14,993

[1] Including the shares of Byelorussian S.S.R. and Ukrainian S.S.R.

TABLE 6.—*U.S.S.R.: Trade with mainland China*

[In millions of old rubles]

Year	Exports	Imports	Trade balance
1950	1,552.8	765.0	787.8
1951	1,913.7	1,325.0	588.7
1952	2,216.9	1,655.0	561.9
1953	2,790.3	1,898.9	891.4
1954	3,037.1	2,313.4	723.7
1955	2,993.4	2,574.0	419.4
1956	2,932.1	3,056.9	−124.8
1957	2,176.4	2,952.5	−776.1
1958	2,536.0	3,525.0	−989.0
1959	3,818.3	4,401.1	−582.8
1960	3,235.8	3,358.5	−122.7
Total, 1950–60	29,202.8	27,825.3	1,377.5
1961	1,454.6	2,183.7	−729.1
Total, 1950–61	30,657.4	30,009.0	648.4

Sources: 1950–54, 63; 1955–61, 45.

TABLE 7.—*U.S.S.R.: Long-term credits extended in 1959–60, excluding military aid*

	Date of the agreement	Amount (millions of U.S. dollars)	Period of utilization	Period of repayment (years)	Interest rate	Stated purpose
To Soviet area:						
Albania	1959	91.5				Loan at liberal terms for economic development.
Bulgaria	December 1960	162.5				Loan agreed upon in December 1960 and announced in January 1961, together with the postponement of repayments on previous credits.
Mongolia	February 1960	5.0				Building construction.
	do	27.5				Economic and technical assistance.
	September 1960	153.8				Economic and technical assistance in connection with the 1961–65 plan.
North Vietnam	1959	25.0				Loan at liberal terms.
	June 1960	87.5				Technical aid in agriculture.
	1960	107.5				Economic and technical assistance in connection with the 1961–65 plan.
To rest of world:						
Afghanistan	1959	80.0				Construction of road connecting Soviet border to southern Afghanistan. It is not clear whether it is a loan or a grant.
Argentina	May 1960	100.0				Some sources report this loan in 1959.
Cuba	April 1960	100.0	1961–65	12	2.5	Purchase of equipment and machinery. Some sources report this loan in February 1960.
Ethiopia	July 1959	100.0				Construction of industrial plants and technical assistance.
Finland	Dec. 22, 1959	125.0	5 years	12	2.5	Industrial machinery and railway equipment. Repayment in Finnish exports.
Ghana	December 1960	40.0		12	2.5	Volta project. Credit offered in August 1960.
Guinea	Aug. 24, 1959	35.0	1960–63	12	2.5	Economic and technical assistance.
India	Sept. 12, 1959	375.0		12	2.5	Construction of industrial plants and purchase of agricultural equipment. Some sources report an additional loan of $25,000,000 for oil refinery.
Indonesia	May 3, 1959	17.5	1959–62	12	2.5	Economic development. This loan covers the construction of a stadium ($12.500,000 by 1962) and merchant marine academy at Ambon ($5,000,000).
	Feb. 28, 1960	250.0		12	2.5	Construction of industrial plants, geological surveying, and vocational training.
Iraq	Mar. 16, 1959	137.5	7 years	12	2.5	Construction of industrial plants and irrigation works to be utilized in 1959–66.
	May 1960	45.0		12		Supplementary credit to Mar. 16, 1959, agreement.
Nepal	Apr. 24, 1959	7.5				Construction of industrial plants and health establishments. Possibly a grant.
United Arab Republic (Egypt)	Jan. 18, 1960	225.0		12	2.5	Aswan Dam—some sources report $187,000,000.
Yemen	End 1959	15–20	5 years	15	2.5	Agricultural equipment.

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TABLE 8.—*U.S.S.R.: Long-term credits to countries of the Soviet area, excluding mainland China, 1959–60*

[In millions of U.S. dollars]

	Commitments		Drawings		Repayments [1]	
	1959	1960	1959	1960	1959	1960
Albania	91.5		10.4	25.6	2.6	2.6
Bulgaria		162.5	45.7	66.8	21.7	21.8
East Germany			6.8	14.2	42.5	42.5
Hungary			39.0	27.8		4.1
Poland			58.4	58.3	11.3	11.2
Rumania			23.4	26.1	9.0	9.0
Total	91.5	162.5	183.7	218.8	87.1	91.2
North Vietnam	25.0	0 195.0		3.2		
Outer Mongolia		186.3	20.0	26.2	22.5	22.5
Total	116.5	543.8	203.7	248.2	109.6	113.7
Transactions in—						
Gold and foreign exchange					48.8	48.7
Commodities	116.5	543.8	155.1	183.3	60.8	65.0
Services			48.6	64.9		

[1] Estimates exclude repayments by North Korea which were postponed under the terms of the Oct. 13, 1960, agreement.

TABLE 9.—*U.S.S.R.: Long-term economic credits to countries outside the Soviet area, 1959–60*

[In millions of U.S. dollars]

	Commitments		Drawings		Repayments	
	1959	1960	1959	1960	1959	1960
Afghanistan	80.0		20.5	23.0	7.3	7.3
Argentina		100.0	2.3	7.2		
Burma			1.8	1.3		
Ceylon			.4	.2		
Cuba		100.0				
Ethiopia	100.0			2.0		
Finland	125.0			1.2	10.0	
Ghana		40.0				
Guinea	35.0			.1		
Iceland					.1	.3
India	375.0		26.5	7.3	9.2	20.2
Indonesia	17.5	250.0	12.0	2.0		
Iraq	137.5	45.0		4.6		
Nepal	7.5					
Syrian Arab Republic			1.0	2.0		
United Arab Republic (Egypt)		225.0	31.4	31.6		
Yemen	20.0		2.0	2.1		
Yugoslavia			.6		2.1	
Total	897.5	760.0	98.5	85.1	28.7	27.8
Transactions in—						
Foreign exchange				2.0		
Commodities	897.5	760.0	82.3	64.9	28.7	27.8
Services			16.2	18.2		

APPENDIX A

Economic and technical assistance agreements between the U.S.S.R. and less-developed countries, 1959

Country	Date	Agreement
Afghanistan	March (?)	Gift of 40,000 tons of wheat.
	May 28	Agreement for construction of highway.
	May	Protocol to economic and technical assistance agreements: Specification of projects.
	July	Do.
	August	Do.
	September	Agreement for the construction of irrigation and power project. The foreign exchange cost is valued at $18,700,000 and local currency cost at Af366,000,000.
	End of 1959	Technical assistance for surveys and construction of roads.
	1959	Credit of $80,000,000.
Argentina	November	Petroleum company announces that deliveries under the $100,000,000 credit will soon begin.
Brazil	Dec. 9	Trade agreement for 3 years. Total trade of $208,000,000, of which $50,000,000 in 1960, $70,000,000 in 1961, and $88,000,000 in 1962.
Ceylon	March	Protocol to February 1958 credit agreement.
Ethiopia	July	Credit of $100,000,000.
	Nov. 27	Student and teacher exchange.
	December	Trade agreement and protocol to credit agreement.
Finland	Dec. 22	Credit of $125,000,000.
Ghana	April	Geological mission.
Guinea	Aug. 24	Credit of $35,000,000.
India	April	Agreement on construction of a thermoelectric plant.
	May 29	Agreement on construction of plants for producing pharmaceuticals.
	June 27	Delivery of blueprints of the industrial plant at Ranchi.
	July	Delivery of blueprints of optical industrial plant at Durgapur.
	July 23	Gift of a plant to repair machinery at Suratgarh.
	Sept. 12	Credit of $375,000,000.
Indonesia	Jan. 3	Protocol to 1956 credit agreement, specifying the list of projects.
	May 3	Credit agreement.
	July 28	Protocol to credit agreement in construction of a stadium for Asian games and other projects to be built by 1962 and valued at $17,000,000.
Iraq	Mar. 16	Technical assistance for establishment of industries (credit of $137,500,000).
	March	Student exchange.
	May 5	Presumably protocol to the Mar. 16 credit agreement.
	End of June	Delivery of military aid.
	July 24	Gift of a school.
	July	Protocol to agreement on economic and technical assistance. Agreement on construction of port installations.
	August	Soviet mission for survey for Euphrates Dam.
	Nov. 12	Technical aid for railroads.
	1959	Aid for education, atomic reactors, geological survey, etc.
Nepal	Apr. 24	Credit or gift of 30,000,000 rubles.
Syrian Arab Republic	Jan. 12	Agreement on construction of railroads.
	September	Agreement on irrigation project, valued at FF14,000,000,000.
Yemen	End of 1959	Credit of $20,000,000.
	1959	Deliveries of military aid valued at $15,000,000 and military instructors.
	1959	Soviet Union completed construction of an airport. It is possible that a $10,000,000 credit was granted for the project.

APPENDIX B

Economic and technical assistance agreements between the U.S.S.R. and less-developed countries, 1960

Country	Date	Agreement
Afghanistan	July 18, 1959–Feb. 18, 1960.	Technical training of workers in U.S.S.R.
	Jan. 19	Agreement to finance irrigation and power project, valued at $22,000,000. U.S.S.R. will provide a credit that may be part of the 1959 agreement.
	Mar. 6	Gift of 50,000 tons of wheat.
	May 25	Protocol on technical aid for river port of Kizil-Kala; the agreement includes delivery of equipment.
	Nov. 12–13	Assistance in geological survey.
Argentina	January	Protocol to the 1958 oil credit: $50,000,000 of the credit will be used to import machinery other than oil-drilling equipment.
	May	Credit of $100,000,000.
Cambodia	May 10	Official delivery of hospital built as a gift from the U.S.S.R., valued at $6,000,000.
Cuba	Feb. 13 (or Apr. 1960)	Credit of $100,000,000, 2.5 percent interest. U.S.S.R. agrees to buy 1,000,000 tons of sugar each year for 5-year period. ⅕ (200,000 tons) will be paid in dollars; the balance will be applied against Cuban purchases in U.S.S.R.
	Nov. 16	Technical assistance for geological survey.
	do	Technical training in U.S.S.R.
	Dec. 19	Technical assistance for establishment of industries; the agreement includes deliveries of equipment.
Ethiopia	Mar. 8	U.S.S.R. agrees to construct a technical school as a gift.
	Mar. 25	Protocol to July 1959 credit: Agreement on construction of plants and on surveys.
Ghana	Aug. 4	Agreement on economic and technical cooperation (credit of $40,000,000).
	Dec. 23	Protocol to Aug. 4, 1960, agreement, specifying enterprises to be financed.
Guinea	Mar. 1	Radio station as a gift.
	do	Protocol to economic and technical agreement of Aug. 24, 1959, specifying the use of the credit granted in 1959.
	Sept. 8	Protocol to Aug. 24, 1959, agreement.
India	Feb. 12	Protocol to Sept. 12, 1959, agreement, specifying enterprises to be financed by the $375,000,000 credit.
	Apr. 22–Aug. 22	Exchange of cotton technicians.
	June 16	Technical assistance for oil exploration, to be paid out of the Sept. 12, 1959, credit.
	July	Trade agreement for delivery of Russian oil (1,500,000,000 tons) during the next 3½ years; payments in rupees.
Indonesia	Feb. 28	Agreement of economic and technical cooperation (credit of $250,000,000).
	July 1	Revision of the May 3, 1958, agreement. U.S.S.R. will build 1, instead of 2, steel mills (according to Sept. 15, 1956, agreement).
	do	Agreement on atomic energy: Soviet Union will supply equipment and technical assistance.
	Oct. 14	Gift of a hospital to be built during 1961–63.
Iraq	Mar. 20	Agreement on technical assistance.
	Aug. 18	Agreement on economic and technical assistance. Credit granted on Mar. 16, 1959, is increased by 180,000,000 rubles.
Nepal	Aug. 2	Technical aid for a hydroelectric plant.
Syrian Arab Republic	Sept. 7	Economic and technical assistance agreement. Protocol to Oct. 28, 1957, agreement.
United Arab Republic (Egypt)	Aug. 11	Technical aid for construction of metallurgica plant.
	Aug. 27	Agreement on economic and technical assistance for Aswan dam. Credit of 900,000,000 rubles.
Yemen	Mar. 28–Apr. 4	Technical aid for construction of a canal.
	June 25	Technical aid for harbor development.

APPENDIX C

Economic and technical assistance agreements between U.S.S.R. and the Soviet area, 1960

Country	Date	Agreement
Albania	July 19	Technical assistance for construction of cement plant.
	Aug. 31	Technical assistance for hydroelectric plant.
Bulgaria	Jan. 20	Technical assistance for maize mill.
	June 28	Technical assistance and equipment for telecommunications center.
	do	Increase of previous aid for construction of 3 thermoelectric plants.
	July 22	Technical assistance for several projects.
	Oct. 8	Technical assistance for construction of a dam.
	Nov. 29	Technical assistance for several projects.
	Nov. 30	Technical assistance in the mining field.
	do	Technical assistance and equipment for maize mills.
	Dec. 1	Technical assistance and equipment for several industrial projects.
	Dec. 31	Long-term credit of 650,000,000 rubles for purchase of industrial machinery; in addition, repayments of 160,000,000 rubles due in 1961–63 are postponed. The agreement was announced on Jan. 1, 1961.
Czechoslovakia	Mar. 7	Agreement on construction of high-tension line.
	Mar. 31	Technical assistance for industrial plants.
	May 12	Technical assistance in oilfields.
Eastern Germany	Mar. 1	Technical assistance and equipment for construction of industrial plants.
	Aug. 10–30	German technicians sent to U.S.S.R. to work in an aluminum plant.
	Sept. 27	Exchange of gas and oil field technicians and documents.
Mongolia	Feb. 11	Economic and technical assistance agreement (credit of 110,000,000 rubles).
	do	Agreement on aid for building construction (credit of 20,000,000 rubles).
	Mar. 28	Agreement on construction of mills and other plants.
	Sept. 9	Agreement on economic and technical assistance for the 1961–65 development plan (credit of 615,000,000 rubles).
	Sept. 27	Technical assistance and equipment in the field of education.
	do	Technical assistance agreement.
	do	Technical assistance for industry, agriculture, public welfare, etc.
	Nov. 14	Technical assistance for telephone installations.
North Korea	July 11	Technical assistance for a cinema studio.
	Aug. 1	Survey for a dam.
	Aug. 31	Geological survey.
	Sept. 30	Survey for central heating of a city.
	Oct. 13	U.S.S.R. cancels a claim of 760,000,000 rubles, arising from credits granted in previous years, and postpones the repayment of 140,000,000 rubles.
	Dec. 24	Agreement on aid to be delivered in 1961–67.
North Vietnam	June 14	Technical assistance for agriculture (credit of 350,000,000 rubles).
	Aug. 2	Technical assistance for improvement of harbors.
	Aug. 26	Technical assistance for fish industry.
	Sept. 30	Technical assistance for coal mine.
	Dec. 23	Agreement on economic and technical assistance in connection with the 1961–65 plan. Credit of 430,000,000 rubles and a grant of 20,000,000 rubles to fight malaria.
Poland	Mar. 10	Technical assistance for industrial plants.
	Sept. 13	Technical assistance for a thermoplant.
	do	Technical assistance for construction of a canal.
Rumania	Nov. 11	Technical assistance for industrial plants.

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RECENT DEVELOPMENTS IN SOVIET PLANNING

BY

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RECENT DEVELOPMENTS IN SOVIET PLANNING[1]

Introduction

In May of 1957 the structure of industrial administration in the Soviet Union underwent a major reorganization. The administrative and planning bureaucracy, which at that time was organized along lines of branches of production, was overhauled and reorganized along lines of geographic regions. The main economic reasons given for the reform centered around the type of behavioral characteristics which the executives in the industrial ministries had developed. They had become excessively concerned with the interests of their own ministries, in the process ignoring the overall interests of the national economy. In the context of the Soviet economy and Soviet economic planning, this led to the growth of barriers isolating the ministries from each other and thus to significant deficiencies in the use of economic resources. The new system, it was hoped, would eradicate these deficiencies.

Since the time of the reorganization, many changes have been introduced into the organization of industrial administration and planning. The purpose of this paper is to describe some of these changes. To some extent this paper serves to update the discussion of Soviet planning contained in the paper I contributed to the 1959 Joint Economic Committee study of the Soviet economy.[1] The concentration is again on short-term planning, the construction of the annual state plan for the development of the national economy; but we do not go into planning methodology in quite so much detail and while we do again emphasize the planning of materials supply, our scope is somewhat broader.

We begin by describing some of the major changes made since 1957 in planning organizations and procedures. We then discuss the effects of these changes. And we conclude with a few words on the relevance of current discussions in Soviet economic circles to our subject.

Some Major Changes Since 1957

The supreme authority and policy maker in the institutional hierarchy of Soviet planning is the Communist Party as represented in its Presidium. The chief executive body is the Council of Ministers of the U.S.S.R., which has as one of its functional committees the State Planning Committee (Gosplan). In the actual process of plan construction, Gosplan plays the primary operational role; the direct participation of the Council of Ministers as such taking the form of the transmission of general policy objectives (formulated by the Party Presidium) and the review and confirmation of the plan (at both an intermediate and final stage of its construction).

[1] Levine 59.

This was true before the reorganization and was not changed by it. But the line of command below the Gosplan level was changed. Before the reorganization it ran from Gosplan to the branch line ministries, to the main administrations of the ministries, to the basic enterprises under the jurisdiction of individual ministries. This was changed by the reorganization to run from Gosplan to the councils of ministers of the 15 union republics and the gosplans of these republics, to the 100-odd councils of the national economy (sovnarkhozes), which administer almost all the enterprises within a given economic region, and finally to these enterprises.

Along with these changes in the lines of command, the structures of existing organizations were altered in relation to their new functions and new structures were created for the new organizations in relation to their functions. Furthermore, the period since the reorganization has been replete with organizational changes as the Soviet regime attempts to adjust and improve its new planning machinery.[2]

Gosplan

At the time of the reorganization, the functions of long-term and short-term planning were performed by two separate organizations—Gosplan (long term) and Gosekonomkomissiia (short term). Under the reorganization, Gosekonomkomissiia was abolished and Gosplan was made responsible for both long- and short-term planning. But, as has happened many times before,[3] this situation did not last for very long. In April 1960, a relatively new organization, Gosekonomsovet (State Scientific-Economic Council) was given the responsibility for long-term planning—20-year plans and 5–7-year plans—and Gosplan was restricted to matters concerned with the construction of the annual plans.[4]

As a result of the reorganization, however, Gosplan plays a larger role than before within the sphere of short-term planning. It now has many of the functions previously performed by the former ministries. It now is responsible, through its industrial branch departments, for the correct development of the separate branches of industry, i.e., it is responsible for the construction of branch output, investment, location, and technological plans. In view of these increased duties, Gosplan's industrial departments have grown substantially in importance. This increased importance was highlighted by Khrushchev in his *Theses* on the reorganization: "* * * the heads of the main departments of the State Planning Commission should be of the caliber of the present ministers."[5] The Council of Ministers has followed this principle in appointing the heads of these departments. In 1960, of 15 known department heads, 11 were formerly either ministers or deputy

[2] "The [new] apparatus is like a huge experimental machine, which is undergoing testing. Some joints and links of the machine do not mesh properly and need to be adjusted." *Sovetskaia Moldavia,* Nov. 1, 1958, p. 3.

[3] For a short account of the postwar history of Gosplan, see Levine 59, p. 153.

[4] See Spravochnik III, pp. 262–266. The State Scientific-Economic Council was formed in February 1959, initially to coordinate the work of various economic research organizations. It is not clear what functions it actually performed between then and April 1960 (see CIA 61, pp. 8, 13–14).

In addition to its responsibility for the construction of long-term plans, Gosekonomsovet is responsible for the development of planning methodology and tools of economic analysis. To aid in this, the Economic Research Institute of Gosplan was transferred to it.

[5] Khrushchev 57, p. 10.

ministers.[6] Furthermore, of the 12 members of Gosplan who, as of December 1959, were members of the Council of Ministers, 4 were known to have been department heads (and 2 others might have been).[7]

A major addition to the Gosplan staff was made with the transfer to it of the former ministerial glavsbyts (main administrations of sales). This was done at the time of the reorganization, it was said, to preserve the existing economic ties and to secure the uninterrupted supply of materials to the economy during the early, transitional years. In line with these objectives, it appears that the functions the glavsbyts were to perform while part of Gosplan were identical to those they performed when they were departments of the industrial ministries:

> The glavsbyts retained the right to give instructions (*ukazaniia*) to producing enterprises, local sales offices and bases, and other organizations on the procedure and sequence of shipping products, to make changes in the assortment of funded products and in the delivery plans of (centrally) planned products, to receive from the enterprises and local sales offices accounts on the fulfillment of the delivery plans of products to consumers.[8]

The mention here of the "right to give instructions" raises the important question of the extent of administrative powers given to Gosplan under the reorganization. It is usually argued that Gosplan was not given administrative powers over the economy and in this respect is different from and weaker than the former industrial ministries. To a certain extent this is correct. However, the former ministerial glavsbyts, when transferred to Gosplan, did retain their administrative powers directly over their subordinate enterprises (and this also is true of the sales administrations which succeeded them). The role they played in the final stage of plan construction—the issuing of detailed output assignments to the producing enterprises and the setting of enterprise producer-consumer ties—has been preserved. To this extent then, Gosplan does possess some administrative powers.

In April 1958, at about the same time that the classifications of centrally distributed industrial materials were changed,[9] the Gosplan glavsbyts were reorganized into 10 main administrations for interrepublican deliveries under Gosplan, each of which concerned itself with a broad product sector.[10] Their functions were limited to planning the interrepublican deliveries of products, the exact list of which was to be determined by Gosplan, and to supervising the fulfillment of these deliveries by the sales organs of the union Republics.

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[6] From an unpublished study by Jerry Hough at the Russian Research Center, Harvard University, 1960.

[7] Committee 60, p. 34.

[8] Gal'perin 57, p. 45.

[9] See Levine 59, pp. 155–56. Under the new classification system, Gosplan is to plan the distribution of and issue *fondy* for the acquisition of those products which are the most important for the national economy, those which are in the most serious short supply and those which are produced and used in several republics.

[10] The 10 main administrations for interrepublican deliveries cover the following sectors: metals, electro-technical products and implements, machinery, lumber and construction materials, coal, petroleum products, heavy machinery, defense and radio-technical products, raw materials for light industry, raw materials for the food processing industry (Spravochnik II, pp. 289–290).

Subsequently their number was raised to 13 with the addition of main administrations for chemicals, automotive and tractor products, and consumers' goods. (Fasoliak 61, p. 16) Koldomasov 61, pp. 14–15, speaks of 14 such main administrations.

In addition, two further organizations have been added: Soiuzglavkomplekt and Soiuzglavkhimkomplekt, which are involved in planning the complete supply of materials and equipment to factories that are being constructed or reconstructed—the first being concerned with factories in leading branches in general, and the second with factories in the chemical industry (Koldomasov 61, p. 15).

While they were given the right to issue orders (as were also the republican gosplans and sovnarkhozes) for the shipment of products, within the bounds of the production and sales plans (which were to be set in the "established manner") they were strictly forbidden from giving instructions directly to enterprises for changes in production plans. Furthermore, their network of local sales offices were given to the republican councils of ministers and the latter were to decide which of these should be under the jurisdiction of the republican gosplans and which should be given to the sovnarkhozes.

The intent of the April 1958 decree evidently was to decrease the power of Gosplan's former ministerial glavsbyts. But this decree was followed in a fairly short time by one which restored much of their lost power. In a decree issued in January 1959, it was stated that "the distribution of orders for the manufacture of products * * * is accomplished in a centralized way" by the main administrations of interrepublican deliveries "together with" the republican gosplans. Moreover, the decree takes pains to make it clear that the instructions of the main administrations of interrepublican deliveries of Gosplan U.S.S.R. are "obligatory for the supply and sales organs of the union republics." [11] Current writings on the subject describe the functions and powers of the main administrations of interrepublican deliveries again as being almost identical (mutatis mutandis) to those of the former ministerial sales administrations. In fact one recent source has added to their powers "the right to give orders to the republican supply and sales organs on the timing of their shipments of products to users." [12]

State committees

In addition to Gosplan's branch departments and main administrations for interrepublican deliveries, another group of central organizations which perform some of the functions formerly perfomed by the ministries is the group of state committees attached to the Council of Ministers. These state committees—about a dozen in number—are organized along branch of industry lines and are concerned with the long-term planning of their respective branches, the development of advanced technology, economic research, and the like. They do not appear to have any operational powers.[13]

Republican gosplans

While Gosplan was being altered, the gosplans of the union republics were being thoroughly revamped. The new organization of industrial management along geographic lines required them to perform planning and coordinating functions they had not performed before, functions similar to those performed by Gosplan U.S.S.R. As a result, each republican gosplan has taken on the appearance of a miniature (and in the case of some—the R.S.F.S.R. Gosplan, for example—not so miniature Gosplan U.S.S.R. The republican gosplans now have summary and industrial departments, and main administrations for supply and sales (glavsnabsbyts) organized by product groups (coverage varies from republic to republic). These glavsnabsbyts are to perform all the work connected with the construction of the supply plans for the sovnarkhozes located within the

[11] Spravochnik II, pp. 374–376.
[12] Koldomasov 61, p. 15.
[13] See Zakon, Akty I, pp. 65–87; Spravochnik III, p. 264; Nove 62, pp. 1, 15.

republic, are to issue orders (*nariady*) for the production and distribution of those products produced and consumed within the given republic, and are responsible in general for the construction and supervision of delivery plans of products which in the new classification system come under the aegis of the individual Republics.[14]

As with Gosplan U.S.S.R., the question of the "operational powers" enjoyed by the republican gosplans is somewhat blurred by the power given to the glavsnabsbyts to issue orders to subordinate enterprises for the production and distribution of specific products. However, this seems to be the sole operational power possessed by the republican gosplans:

> The republican gosplans do not possess powers to issue orders and interfere in the administration of the economic regions. The gosplans must draft proposals and submit them for consideration to the councils of ministers of the republics.[15]

All-republic sovnarkhozes

Soon after the introduction of the sovnarkhoz system, complaints began to be heard about the administrative burden being placed upon the councils of ministers in the large, multisovnarkhoz republics. Since they were the only republican bodies with the authority to give legal directives to the sovnarkhozes they were being overloaded with the settling of day-to-day problems arising from intersovnarkhoz relations. This situation was especially acute in the Russian Republic where there were 67 sovnarkhozes. Moreover, the republican gosplans were also to some extent getting involved in operational work concerned with the relations among the individual sovnarkhozes of their republics and this detracted from their planning work. Proposals were made that some independent organizations be set up to take care of these administrative problems. In June and July of 1960, all-republic sovnarkhozes were established in the Russian Republic, the Ukraine, and Kazakhstan.[16] The all-republic sovnarkhozes were made directly subordinate to their respective republican councils of ministers, the local sovnarkhozes were made subordinate to both their republican council of ministers and their all-republic sovnarkhoz, and the all-republic sovnarkhozes were given the administrative power to suspend ordinances and regulations issued by the sovnarkhozes subordinate to them.[17] At first it appeared that the all-republic sovnarkhozes would be concerned solely with operational matters. The decree of the Party Central Committee and the Council of Ministers of the U.S.S.R., which recommended that they be established, stated that they should "concentrate their attention on ensuring the fulfillment of the national economic plans of the republic and the coordination of the economic activity of the sovnarkhozes." But the decree went on to say, "The range of questions which should be decided by the [all-republic] sovnarkhozes is to be determined by the council of ministers of the union Republic."[18] It seems that the councils of

[14] See Koldomasov 59, pp. 58–59; Koldomasov 61, p. 16.
[15] Frolov 58, p. 58.
[16] Sovetskaia Rossiia, June 19, 1960; Kazakhstanskaia Pravda, June 24, 1960; Rabochaia Gazeta, July 7, 1960. Also, Uzbekistan abolished its four individual sovnarkhozes and established in their place one sovnarkhoz for the entire Republic (Pravda Vostoka, July 2, 1960).
[17] Spravochnik III, pp. 316–317. It is interesting that as the situation now stands, only the republican council of ministers has the legal right to revoke ordinances and regulations of sovnarkhozes, while the all-republica sovnarkhoz and the Council of Ministers of the U.S.S.R. can legally only suspend them (ibid.).
[18] Zakon. Akty I, pp. 34–35, 59.

ministers decided to expand the scope of activity of the all-republic sovnarkhozes into the field of planning. This was clearly so in the Russian Republic, for in an article published in October 1960 it was stated:

> The formation of the All-Russian Sovnarkhoz undoubtedly will lead to changes in the work of the RSFSR Gosplan on the construction of annual plans. It will permit the decrease of the number of plan indicators confirmed by the RSFSR Council of Ministers due to the transfer of part of these indicators to review and confirmation by the All-Russian and local sovnarkhozes. * * * Insofar as (*poskol'ku*) the function of materials supply will be carried out by the All-Russian Sovnarkhoz it is expedient to include targets for the production of only the most important items, without detailed breakdowns by types and sorts, in the national economic plans confirmed by the RSFSR Council of Ministers. All further detailing of the plan should be done by the respective organs of supply and sale of the All-Russian Sovnarkhoz.[19]

Another source, published in 1961, lists a number of functions to be performed by the all-republic sovnarkhozes in the planning and operation of the materials supply system. And it adds that to aid in their performance of these tasks, the all-republic sovnarkhozes were given the main administrations of supply and sales of individual products which were formerly attached to the republican gosplans. At the same time, the source lists a number of departments of consolidated balances and distribution plans as still being in the organizational structure of the republican gosplans.[20] Consequently, it may be surmised, that the all-republic sovnarkhozes work primarily on the supply problems of the individual industrial branches within each republic, while the republican gosplans handle the problem of coordinating the different branches. However, even if this is accepted procedure, it does not answer all the questions of definition and distinction of duties among the republican councils of ministers, republican gosplans, and all-republic sovnarkhozes which can and did arise as a result of the unusually vague instructions given by the government when the all-republic sovnarkhozes were established. But more about such matters below.

Territorial coordinating and planning councils

It was clear at the time of the reorganization that almost all of the 105 economic-administrative regions were not of sufficient size or scope to be economically rational. Although there may have been some immediate administrative advantages (and even more so, political advantages) in the form taken by the economic regions, they were too small for most economic purposes. The need then was to establish some system whereby the activities and plans of the sovnarkhozes lying within larger, economically more meaningful regions could be coordinated.

For many years regional planning had been conducted in a vague sort of way on the basis of 13 large or basic regions. In July of 1960 a plan was put forth which established 16 basic regions and called for the setting up of councils to plan and coordinate the work of the sovnarkhozes within these regions (or at least within 14 of them).[21] For a while it looked as if this plan would be put into immediate operations. In the planning forms to be used for the construction of

[19] Maevskii 60, p. 37.
[20] Fasoliak 61, pp. 15–17.
[21] CIA 61, p. 15.

the 1961 plan (distributed in September 1960) there was a section entitled "Basic Indicators by Economic Regions," and attached to the forms was an appendix on the new set of 16 large economic regions.[22] Furthermore, when the structural frame of the Russian Republic Sovnarkhoz was announced in October 1960, it included 10 regional sections which presumably corresponded to the regions in the new scheme.[23] But talk of the scheme then languished and it was not until May 1961 that it was announced that the plan, in a slightly modified form, was being put into operation. In the modified version, 17 large economic regions were established, with Byelorussia and Moldavia being separated from the rest and remaining as individual economic administrative regions. There were 10 regions in the RSFSR, each containing from 5 to 12 sovnarkhozes; 3 in the Ukraine, each containing from 3 to 6 sovnarkhozes; one in Kazakhstan, containing 9 sovnarkhozes; one covering the 3 sovnarkhozes in the 3 Baltic Republics; one covering the 3 sovarnkhozes in the 3 Transcaucasian Republics; and one covering the 4 sovnarkhozes in the 4 central Asian Republics. Each of the regions is to have a coordinating and planning council, except for the Kazakhstan region, where the Kazakhstan Gosplan is to be responsible for the planning and coordinating work.[24]

The first sessions of the coordinating and planning councils in all 10 of the large economic regions of the RSFSR were held from November 1961 to January 1962.[25] As with many first sessions, these appear to have been large, general meetings which serve as an introduction to the real work which is to come. The major concern at the sessions was the overall development of the economy of each region and in particular, "the introduction of specialization and cooperation of production and improvements in interbranch and interregional ties." [26] Full-time vice chairmen were appointed (and confirmed by republican party organs) for all 10 coordinating and planning councils, and a total membership of 740 for the regional councils in the RSFSR was approved, to include secretaries of province and territory party committees, regional government officials, chairmen of sovnarkhozes and planning commissions, directors, chief engineers, and designers of major enterprises and institutes, and scientists and other specialists.

The sovnarkhozes

The sovnarkhoz is the organizational body which directly administers the enterprises, lying within a given economic region, in all economic matters including short-term planning.[27] The sovnarkhoz itself is a council consisting of a chairman, deputy chairman, and other members. It is served by a set of functional departments and a set of branch administrations. Among the functional departments

[22] Kotov 60, p. 25.
[23] CIA 61, p. 13.
[24] Ekonomicheskaia Gazeta, May 28, 1961; CD/SP, XIII: 41, pp. 16–17; CIA–61, pp. 15–16.
[25] This paragraph is based upon the artcle by P. Lomako in Pravda, Feb. 23, 1962, as it appears in CD/SP, XIV: 8, pp. 23–24.
[26] Ibid.
[27] Not all enterprises come under the jurisdiction of the sovarkhozes—some are under the remaining ministries and some are under local governmental bodies. A 1961 source states that the sovnarkhozes account for three quarters of total industrial output, and this includes either all or at least the predominant part of each major industrial product (Koldomasov 61, p. 13).

normally there is a planning department and one concerned with materials supply and sales. However, each branch administration also has its own supply department. Although practice varies, it appears that usually the supply departments of the branch administrations are the ones directly involved in the construction of the annual plans, while the functional departments of supply and sales of the sovnarkhozes are responsible for overall supervisory and coordination work. [28]

In a number of sovnarkhozes, the supply and sales administration took over and consolidated the local supply offices, and then after the decree of April 1958 also some of the local sales offices. These supply and sales offices were operated as sales stores from which all the enterprises within the economic region could buy.[29]

Under the original regulations, the sovnarkhoz was given the right to redistribute materials, fuels, machinery and equipment, from one enterprise under its jurisdiction to another regardless of the branch affiliations of these enterprises.[30] In January, 1959, in one of the most important changes in the powers of the sovnarkhoz to be made since the reorganization, this right was revoked.[31] We will return to this matter also in a moment.

Plan construction procedure

The process of annual plan construction has undergone repeated alterations since the reorganization, and as a result it is not too clear what the actual situation is today. Indeed, two 1961 books on supply planning, submitted to the press less than a month apart, give somewhat conflicting descriptions of the prescribed sequence of plan construction.[32] Soviet economists are much concerned about this. A member of the Ukrainian Gosplan recently attacked "the annual establishment of a special procedure and chronology for plan construction." [33] And the chairman of a sovnarkhoz complained that a set schedule for plan construction has not been worked out yet, and he added: "One gets the impression that we are in an 'interregnum.' " [34]

With this background in mind, let us try to construct what at best will be an idealized picture of the current procedure of plan construction.[35]

At the time of the organization, one of the important changes introduced was the initiation of annual plan construction at the enterprise itself on the basis of yearly subdivisions of the long-term (5- or 7-year) plan then in effect rather than having the planning process begin with the sending down of control figures from above. This was soon modified and control figures were reintroduced. At first they were restricted to supply limits on about 150 major product groups sent by Gosplan to the republican gosplans. But now it appears that

[28] See Shein 57, p. 10; Dzhavarov 59. For an example of a case where the functional department of supply and sales of the sovnarkhoz (Zaporozhskii) itself performs the planning functions, see Petushkov 60.
[29] See, e.g., Frolov 58, p. 49; Kalinin 58, p. 46.
[30] Direktivy IV, pp. 791, 796.
[31] Spravochnik II, p. 376.
[32] Koldomasov 61, pp. 29–38 and Fasoliak 61, pp. 35–41.
[33] Khliluk 62, p. 45.
[34] CD/SP, XIV: 14, p. 5.
[35] The major sources for our description of the planning chronology are: Kolodomasov 59, p. 60; Evenko 59, pp. 68–70; Kolodomasov 61, pp. 29–38; Fasoliak 61, pp. 35–41; and personal interviews at the Economics Research Institute of Gosplan U.S.S.R. and the Moscow City Sovnarkhoz May and June 1959.

the construction of control figures has taken on such importance that it has led to the division of the planning process into two levels.

On the first level, Gosplan in conjunction with the republican gosplans, and on the basis of the long-term plan then in existence and the performance of the economy since the beginning of the plan, constructs material balances for 150–300 of the most important product groups. Using these balances, Gosplan then puts together preliminary output targets and supply limits addressed to the union republics and all-union organizations (the remaining ministries and the state committees). The balances, targets, and limits are reviewed and confirmed by the Council of Ministers of the U.S.S.R. and output and supply control figures are then sent to the republics and all-union organizations (approximately May 15–June 15 of the planning year). The republics then allocate these control figures to the subordinate sovnarkhozes and the sovnarkhozes to the subordinate enterprises. This ends level one.

Level two begins with the stage wherein the plan makes its way up from enterprise to sovnarkhoz, to all-republic sovnarkhoz (where applicable), to republican gosplan, and then to Gosplan U.S.S.R. (this is to be accomplished by August 1).

Gosplan U.S.S.R., as before, coordinates output plans and input requests and constructs an annual output plan and an annual materials supply plan in which it allocates *fondy* for about 800–1,000 materials,[36] to the individual republics and all-union organizations. The Council of Ministers confirms the distribution plans for only the most important products; the rest are confirmed by Gosplan itself. The state plan is to be confirmed and the *fondy* sent out between September 1 and 15.

The republican gosplans then distribute their allotted *fondy* among their sovnarkhozes, and the sovnarkhozes among their subordinate enterprises. The enterprises construct lists of detailed input requirements within the limits of the *fondy* allotted them. The specified requisitions go up the line from sovnarkhoz to republican gosplan, which sends them to the main administrations for interrepublican deliveries of Gosplan U.S.S.R. This is to be done not later than November 15. The main administrations of interrepublican deliveries "with the participation" of the republican gosplans then work out detailed output and delivery assignments for individual producing enterprises and establish enterprise-to-enterprise supply ties. These are embodied in a "plan for interrepublican deliveries and deliveries for all-union needs." This plan is to be ready by December 1 and orders for the delivery of products sent out so that the are received by producing enterprises not later than December 15. These orders are

[36] This point has led to much confusion. The literature often states that on the order of 12,000–14,000 items are distributed by Gosplan. This includes the items distributed by the main administrations for interrepublican deliveries, formerly distributed by the sales administrations of the ministries, which are not included in the annual state plan for the development of the national economy. The number of products worked on by the industrial and coordinating departments of Gosplan is not clearly stated in the literature. However, Karpov 58, p. 19 gives a figure of 1,000 and the writer was told by members of Gosplan's Economic Research Institute in the spring of 1959 that for the 1960 plan Gosplan was responsible for coordinating the output and distribution of 800 items (this was the same year that Koldomasov 61, p. 24, states that 12,800 items were centrally distributed). Moreover, another source, Ivanov 61, p. 78, states that Gosplan was supposed to construct supply plans for 1961 again for about 12,800 items, but actually only did it for 6,000 items. This looks suspiciously like the 1,000-odd "funded" items and 5,000-odd "centrally planned" items from the years circa 1955–58.

then to serve as the basis for the conclusion of supply contracts signed by producing and consuming enterprises.[37]

It is interesting to compare the times allowed for the various steps in the post- and pre-reorganization chronologies. Gosplan U.S.S.R. has about a month and a half to work out a balanced plan; just slightly less than before. But now a total time of 3 months instead of the former 2 months is allowed for the distribution of *fondy* to the enterprises, the construction, consolidation, and presentation to the main administrations for interrepublican deliveries of specified, detailed requisitions and the assignment of output and delivery plans to the enterprises. One possible explanation for this is that it is more difficult for the republican gosplans to distribute its *fondy* than it was for the branch ministries, because of the multibranch nature of the economy of a republic. Another possible explanation is that it is a recognition of the fact that not enough time was allowed in the prereorganization system for the difficult and time-consuming work involved in the final stage of plan construction.

Continuity of planning

Before leaving this question of the process of plan construction, a few words should be said about recent proposals to improve the continuity of planning. At the time of the reorganization, and increasingly so since, there has been talk about the artificial break in the continuity of planning which was caused by the ways in which calendar periods were used in planning. The following is typical:

> Comrade N. S. Khrushchev has indicated many times that a serious defect in planning is to be found in the situation whereby in going from one year to another and from one five-year period to another, we begin planning from scratch, as it were, whereas the processes of production and construction are continuous.[38]

In 1957, Khrushchev called for the establishment of a planning procedure whereby the basic features of the plan for the following year would already be known in the current year and the basic features of the future 5-year plan, or at least of the early years, would be known in the current 5-year plan.[39] This was taken up in a decree issued in December 1960. The decree instructed Gosekonomsovet, Gosplan, and the republican councils of ministers to present (in a month's time) suggestions for improving planning procedures, with the aim that—

> in drawing up annual plans, the principal targets of economic development for the last year of the current 5-year period should simultaneously be drawn up so as to have a continuously operating 5-year plan.[40]

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[37] The emphasis now is on the need for direct contracts and contract negotiation between enterprises. This was stressed in Khrushchev's theses (Khrushchev 57, p. 11) and has been stressed by all writers since. However, there have been numerous complaints that the use of direct contracts is not sufficiently developed (see, e.g., Kulev 59, p. 27). One source states that the predominant form of contract is still the indirect or "general" contract, usually concluded between offices of the supply and sales administrations of the republican gosplans or of the sovnarkhozes (Khalfina 59, pp. 73, 75; see also Baranov 59, p. 41).

[38] Planovoe Khoziaistvo, 1961:5, p. 39. This phrase: "from scratch, as it were" (*Kak by zanovo*) is repeated practically every time the subject is mentioned—to the point where it appears it is almost official Moscowese.

[39] Ibid., p. 40.

[40] Spravochnik, III, pp. 324–325. This means that when drawing up the plan for 1963, the principal targets for 1967 should also be drawn up.

In March 1961 a conference on planning methodology was held under the auspices of Gosplan. The conference recommended the following system of plans to achieve continuity in planning:[41]

1. General long-range plans of 15–20 years with subdivisions by 5-year periods;
2. Long-term 5-year plans with annual subdivisions;
3. Continuously operating 5-year plans;
4. Annual plans with control figures for the following year.

The last recommendation is to be accomplished in the following manner:

> On the basis of the 5-year plan, annual plans covering the entire range of indicators will be constructed each year at all levels of planning. Simultaneously, control figures covering volume of output of basic products, capital investment, and the introduction of new productive capacities will be established for the following year. The annual plans and control figures will be confirmed and brought down to the level of the enterprises in the established manner.[42]

The construction of these control figures makes it possible to alter the chronology of plan construction, once again starting the process at the enterprise level:

> The enterprises on the basis of the control figures and new possibilities which have developed will present their projects of the annual plans and control figures to the sovnarkhozes and local planning organs, which will consolidate them and bring them to the attention of the republican gosplans.[43]

The recommendations of the conference have not as yet been carried out.[44] It is to be expected that the discussions will continue, for many points remain unsettled. For example, the difficulties of constructing, every year, meaningful continuously operating 5-year plans, and the unclear relationship between these continuously operating 5-year plans and the "normal" 5-year plan.

Problems

This is not the place to attempt an exhaustive analysis of the effects of the reorganization and the numerous changes since then on Soviet planning. But perhaps a few words can be said especially in regard to the planning of material supplies.

A number of the improvements hoped for have, in varying degrees, been achieved. Yet the achievement of these improvements has not been uniform in all economic regions. In many instances, some regions have achieved improvements, while other have either not improved or have even retrogressed.

One of the improvements mentioned most frequently is the closer connections the enterprises now have with their immediate superiors. Formerly, these superiors (in the branch glavk) were usually located in Moscow, but they are now in the given economic region, and thus the myriad decisions which have to be made at this level during the construction of the plan can be made much more easily and quickly than before.

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[41] Planovoe Khoziaistvo, 1961:5, p. 40. This issue of *Planovoe Khoziaistvo* contains 48 pages on the conference, including 2 papers: 14 pages of summaries of discussions; and 10 pages of the formal recommendations of the conference.
[42] Ibid.
[43] Ibid.
[44] See Khiluik 62, pp. 46–47.

There have been some reports of more rational supply lines being established, both in the matter of assigning closer suppliers to consuming enterprises and in the matter of reducing the number of different suppliers serving a single consumer. On balance there seems to have been an improvement in specialization and cooperation in the supply of parts and semifabricates. But also claims are heard that there is not enough specialization, that prereorganization irrational cooperative ties are maintained, or, on the other hand, that there is too much specialization.

Certain improvements have been achieved in the maneuvering of materials within an economic region. In a number of sovnarkhozes, the former local supply bases have been consolidated and transformed into local stores specializing in a given type of material and serving the needs of all the enterprises in the region. This has resulted in more efficient selling and warehousing operation (economies of scale) and better use of transportation facilities. However, there are also complaints that the development of consolidated local supply stores is not moving ahead rapidly enough and as a result enterprises are still inflating their orders in order to get direct (transit) deliveries.

Perhaps 5 years is too short a time in which to expect the eradication of many of the major weaknesses of short-term planning. Nevertheless, it is noteworthy how many of these shortcomings continue in the postreorganization period. Complaints about unrealistic, excessively tight plans are still heard; the annual plan is still completed after the beginning of the planned year; and charges of excessive centralization, bureaucratic duplication, and departmentalism are still made. Let us look further into these last three.

1. *Excessive centralization.*—Despite the fact that the eradication of the excessive centralization of planning was one of the primary aims of the reorganization, it appears that some of the most essential features of this excessive centralization have not only remained but in some ways have even been intensified. All of the central supply planning work is now concentrated in the U.S.S.R. Gosplan. It is not only responsible for the construction of the state plan and state supply plan but also, through its main administrations for interrepublican deliveries, for the assignment of detailed production and delivery orders directly to the producing enterprises. Due to the consolidation of all this work within its domain, Gosplan now issues, or at least is supposed to issue, specific delivery orders covering 12,000 to 14,000 different products.

Gosplan's main administrations for interrepublican deliveries, as we have said, possess the same powers to issue obligatory orders as those which were possessed by the former ministerial glavsbyts. Moreover, it seems that their title is a misnomer, for they give orders directly to enterprises when both producing and consuming enterprise are within the same republic and even when they are under the same sovnarkhoz. In addition to possessing the same powers as the former ministerial glavsbyts, they operate in the same overly centralized manner. A recent Soviet source charges that "All questions connected with the delivery of metal are decided not at the enterprise and republic sales organs but at the Union Main Sales Administration for Metals." [45] Another states that—

[45] See Popov 60.

The union main sales administrations and in particular the Union Main Sales Administration for Heavy Machinery [think they have] the exclusive right to give assignments to factories. They send their orders directly to the producing enterprise. In view of this, the directors of enterprises began more and more frequently to turn to the union main sales administrations for decisions on current problems of production and delivery of equipment. * * * It developed that the orders of the union main sales administrations have become some sort of fetish which has fettered the initiative and operational possibilities of the republican organs.[46]

As a result of this excessive centralization and also because of the cumbersomeness and confusion of the present administrative organization of supply planning (which we will describe in a moment) there are still such manifestations of bad planning as the lack of coordination between an enterprise's supply plan and its output plan, and the lack of coordination between its delivery assignments and its output assignments. Furthermore, these discrepancies are again intensified by numerous changes in the plans made during the year.[47] And there are still complaints about irrationally long transportation hauls and irrationally large numbers of different suppliers serving individual consumers.[48] A clear manifestation of this excess centralization and confused administration is the return of the *tolkach* (the "expediter"). In fact, it seems that not only is he back, but he is back in perhaps greater numbers than before.[49]

2. *Bureaucratic duplication.*—The reorganization was supposed to simplify the organization of planning. But the daily press is filled with articles attacking the postreorganization cumbersome planning bureaucracy. One illustration of one aspect of this is the case of a machine-building enterprise which formerly received detailed production and delivery assignments from a single glavsbyt (that of its own ministry); now it receives orders from five different sales administrations of the U.S.S.R. Gosplan.[50]

Another problem is the attenuation of the planning bureaucracy, the duplication of functions between different organs and the confusion which results. For example, it is still not completely clear what the differentiation in function is supposed to be between the main administration of interrepublican deliveries of Gosplan U.S.S.R. and the main supply and sales administrations of the republican gosplans. At first it was thought that the latter would do most of the planning work for both supply and sales, but then it became clear that the more centralized Gosplan U.S.S.R. administrations were better equipped to distribute directly the products of national economic importance.[51] And now with the erection of all-republic sovnarkhozes, the confusion has grown even worse (this is particularly true in the RSFSR).[52]

Finally, there is duplication of functions at the sovnarkhoz level itself. Earlier we showed that the sovnarkhoz has a set of supply departments, each one of which is attached to a corresponding branch administration of the sovnarkhoz. In addition there is a functional administration of the sovnarkhoz responsible for supply and sales.

[46] Goltvianskii 60.
[47] See, e.g., Frolov 58, p. 56; Kalinin 58, pp. 43–44; Planovoe Khoziaistvo, 1961: 5, p. 46; Gal'perin 62, pp. 70–71.
[48] Lokshin 60, p. 22.
[49] "When the sovnarkhozes were formed, the 'scavengers' disappeared, but they came to life again, this time in the corridors of Gosplan" (Agranovksii 60).
[50] Nikolaev 58. A number of such examples are cited in Nove 62, pp. 2–7.
[51] See Lokshin 60, p. 16; and CD/SP, XIII:14, p. 20.
[52] See e.g., CD/SP, XIV: 14; CD/SP, XIV: 51, pp. 21–22; and Nove 62, pp. 8–9.

It is not clear whether the branch supply departments are to administer the supply of firms within each branch or whether the sovnarkhoz supply administration is to organize the supply of all the firms within the sovnarkhoz. In the beginning it was usual for the branch departments to organize the work, but there is now a lively debate in progress over who should prevail. Some argue that the overall sovnarkhoz supply administration should handle the supply of the entire sovnarkhoz and they point to some sovnarkhozes that have recently abolished the branch supply departments and have, as a result, improved their supply planning and operation.[53] Others argue that this should not be done because the economic region is a multibranch unit and each branch has its own peculiarities.[54]

This raises the general problem which lies at the bottom of much of the confusion, namely, the conflict between the idea of branch line command and territorial line command. In the administrative organization of supply planning, this conflict manifests itself in the choice between organizing supply planning along branch lines, that is, having a single department plan the supply of all the different inputs which are used by the enterprises producing a given type of output product; or organizing supply along a territorial principle, that is, treating the entire industry of the region as one "enterprise" and having the supply administration broken down by input product, each subdepartment in charge of the supply of a given input product to all the units of the territorial "enterprise."

The choice for the whole planning hierarchy is not an either-or proposition, but the question of what is the best combination of the two. At the top planning level it is necessary that some planning body be responsible for the development of a given branch. The original aim of the reorganization was to have Gosplan U.S.S.R. do this at the top level, but to have the actual administration of the enterprise run on the territorial principle. In line with this idea, as we have already shown, the branch departments of Gosplan U.S.S.R. were strengthened and Gosplan was given the former ministerial glavsbyts. Yet it is evident that many Soviet economists were still worried about "the danger of weakening the centralized direction and administration of individual branches of industry."[55] This was one of the points of contention at the February 1957 Plenum of the Central Committee of the party which discussed the reorganization prior to the issuance of Khrushchev's *Theses* in March of that year. Those who wanted stronger branch line command called either for the setting up of special branch committees, with operational powers, attached to the Council of Ministers or for the granting of operational powers to Gosplan.[56] Both of these were refused. But as time has passed, branch line command has been strengthened. This is especially evident in the section of the decree of January 1959 which restricted the right of the sovnarkhoz to transfer materials across branch lines. Under the ministerial system, there was a central body (the ministry) responsible for the production of a given products, say steel. If one steel plant proved incapable of fully

[53] See Petushkov 60; and CD/SP, XIV: 14, p. 4.
[54] See Perevolochanskii 60.
[55] Omarovskii 57, p. 78.
[56] Ibid. and Khrushchev 57, p. 9.

utilizing materials allocated to it, then the ministry would try to shift these "excess" materials to another steel plant so that the output plan of steel would be fulfilled and thus the balances in the national economic plan maintained. Under the sovnarkhoz system as originally set up, the sovnarkhoz could shift the materials to a firm producing something other than steel, thus endangering overall economic balances. When in January 1959 this right was revoked and the sovnarkhoz forbidden to switch materials from one branch to another, central branch direction of the economy was greatly increased.

Evidences of branch line direction in supply planning can also still be seen in the operation of the main supply and sales administrations of the republican gosplans and in the dominance of the branch supply departments in most of the sovnarkhozes. Nevertheless, it seems to be the feeling of most experts that both the sovnarkhozes and the republican gosplans should be organized on territorial lines, and only Gosplan U.S.S.R. should be engaged in branch line planning.[57] If this is to be done, one problem is the construction of effective indicators for determining the output mix of the republican and sovnarkhoz "enterprise," so that the priorities to guide input flows into different branches can be determined.

Undoubtedly we will see a continuing struggle between the branch line responsibilities of Gosplan U.S.S.R. and the territorial responsibilities of the republics and sovnarkhozes. If both sides acquire some sort of parity of power, the resulting system of checks and balances might not be wholly ineffective.

3. *Departmentalism.*—Also of fundamental importance here is the problem of "departmentalism"—the pursuance by planners of their own "narrow" interests. This manifests itself in the postreorganization period in both old forms and new. As far as the old form is concerned, there is much evidence that the main administrations of interrepublican deliveries of Gosplan have the same one-sided set of objectives that they had when they were the ministerial glavsbyts, i.e., they are concerned mainly with the production problems of the producers rather than with the interests of the consumers. This leads to the same sort of problems as before: irrational arrays of suppliers for a given consuming enterprise, frequent changes of suppliers even from quarter to quarter within the year, unnecessarily long transport hauls, impeding of technological progress, etc. Moreover, under the new conditions, the effect of this one-sided concern may be even greater than before, because now the consuming enterprise does not have a clear high-level defender of its interests to counterbalance the dominant market power of the sellers.[58]

The new form of departmentalism is the now much discussed "localism." The problem of localism was clearly recognized from the beginning and was discussed at some length in Khrushchev's *Theses.* Since it is in the nature of the Soviet system for there to

[57] Kulev 59, p. 24 ; Novikov 58 ; and Snegov 59.

[58] "One of the most difficult questions in the field of supply is now the consuming enterprise's lack of its own central organ to defend its interests. Formerly, the enterprise when its supply was interrupted, would most frequently turn to the glavsnab of its ministry or to the local office of the glavsnab located in the region of the supplier. Now, the enterprise has no such representatives either in the center or in the regions of the suppliers. Undoubtedly this is one of the reasons why we still see such things as the journeyings of all sorts of "tolkachi," the shipment of products by airplane and in great haste, the sending of trucks hundreds of kilometers for goods, etc." (Lokshin 60, p. 19.)

be a positive correlation between problems discussed in high circles and subsequent "discoveries" of their manifestations in practice, it would be wise not to exaggerate the prevalence of localist tendencies. However, to deny its existence would also be a mistake.

The protective "family circle" now includes the enterprise and its sovnarkhoz and often also its republican gosplan.[59] Enterprises use many different methods in their efforts to improve the performance of their own economic region. For example, in one case an enterprise adapted its product mix to the specific needs of its own economic region and was thus able to fulfill its output plan, but to the detriment of consumers in other regions.[60] In another, an enterprise illegally distributed most of its output of funded goods (presumably locally) rather than turn it over to the central sales administration for distribution to the economy at large.[61] One frequent complaint concerns the attempt by the sovnarkhoz to make its economic region more self-sufficient by setting up uneconomical enterprises to produce materials needed within the region. The most common complaint of course is that enterprises try to fulfill intrasovnarkhoz delivery plans before fulfilling their intersovnarkhoz delivery plans.[62]

There have been a number of attempts to counteract localist tendencies and to improve intersovnarkhoz coordination and control. First, there was the decree of April 24, 1958, which declared the failure to fulfill intersovnarkhoz deliveries to be a flagrant violation of state discipline and made directors and other officials of enterprises and sovnarkhozes personally responsible for such violations and liable to fines and in cases of repeated violation, criminal prosecution.[63] Secondly, there was the establishing of the all-republic sovnarkhozes. And thirdly, there was the new scheme of large economic regions and their coordinating and planning councils.

Conclusions

One conclusion from this brief survey which is hard to avoid is that Soviet planners are likely to maintain and even intensify their program of modifying and changing various aspects of their planning system. A glance at the present state of research and discussion (and may we say ferment) in Soviet economic and planning circles will readily confirm this belief. Many of the topics currently being discussed are pertinent to the matters covered in this paper. The debate over "success criteria" pertains to the search for safety and the desire for low plans. The veritable flood of activity in the development of mathematical methods (particularly input-output and linear programing) pertains to Gosplan's ability to construct balanced and

[59] One source complains about the sovnarkhozes "intentionally" allowing the use of excessive norms in the construction of zaiavki (Safarian 59). Another accuses both sovnarkhozes and republican gosplans of changing the plans of enterprises, at the end of the planned period, so as to have as many enterprises as possible within their areas "fulfill" their plans (Sovetskaia Kirgiza, Jan. 14, 1959, p. 3.

[60] Bakinskii Rabochii, Nov. 17, 1959, p. 2.

[61] Zaria Vostok, Jan. 20, 1960, p. 3.

[62] See, e.g., Lokshin 60, pp. 22–23 and CD: SP, XIII; 36, p. 29. However, there is some evidence that this manifestation of localism is being somewhat overplayed. Data, presented in Planovoe Khoziaistvo, 1959: 10, pp. 9–11, show that in the first half of 1959, at least, the overall plans for cooperative deliveries of castings, forgings, and stampings were overfulfilled, and intersovnarkhoz deliveries were overfulfilled to a greater extent than intrasovnarkhoz deliveries. There were, of course, some sovnarkhozes which failed to fulfill these plans.

[63] See CD/SP, X : 20, pp. 18, 41.

efficient plans. The development of computer data processing techniques is relevant and useful in both the possible further centralization and decentralization of the planning system as is the recent growth of amalgamated "firms" in various industries. And clearly the continuing discussions of price policy are essential to any plans for decentralization of decisionmaking.

The keynote today in Soviet economic circles is experimentation. We should have every expectation that changes in Soviet planning methods will continue apace. And it would be prudent to expect some of them to result in improvements in the planning system.

Addendum

As this article goes to press (November 29, 1962), details of the changes in the planning system, announced at the just-concluded Central Committee Plenum, are beginning to reach us. From very preliminary reports in the American press, it would appear that the following are the major changes pertinent to our study: the consolidation of the existing 101 economic-administrative regions into 40 regions; the transformation of Gosplan and Gosekonomsovet into perhap one organization with a decreased role in the construction of the annual plan and an increase in the role of the republican gosplans in this process; and the erection of a new central organization (or the resurrection of a very old one)—an All-Union Council of the National Economy.

The purpose of the first change is clear—an attempt to make the economic region of more rational economic size. The second change seems to portend a certain amount of decentralization to the republics in the process of short term plan construction. But the third change seems to portend increased centralization in this process. This seeming paradox can perhaps be explained in terms of the analysis presented above: the struggle between the branch line responsibilities of the center and the territorial line responsibilities of the republics.

The key change appears to be the third. The erection of an All-Union Council of the National Economy, especially in light of the fact that it is to be headed by the former Chairman of Gosplan, could very well mean an important increase in centralized direction through a significant reassertion of branch line command. The industrial departments of this Council having (as yet unclear) administrative and planning powers might take on much of the appearance of the former ministries. It goes without saying, of course, that it is too early to tell.

The writer would have preferred it if the Russians had waited a little while longer before making such major changes in the planning system. It is never pleasant to have one's product somewhat dated before it is even produced. The writer hopes, however, that the analysis he has presented here may prove helpful in gaining an understanding of the current changes.

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