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THE EFFECT OF INFLATION ON FEDERAL EXPENDITURES

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PREFACE

The Effect of Inflation on Federal Expenditures provides an analysis of the automatic and discretionary reaction of federal expenditures to increases in the price level. The study was prepared in response to a request from Congressman Richard Bolling of the Joint Economic Committee. It is one of a series of studies being written in connection with the 30th anniversary of the Employment Act of 1946.

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SUMMARY

The level of federal expenditures is directly affected by the rate of inflation because cost-of-living escalator clauses are built into many entitlement programs and because cost increases for some other services automatically cause some other outlays to rise. Indirectly, the rate of inflation affects federal expenditures that are not explicitly adjusted for inflation in the current law, since either these expenditures must be increased to keep real outlays constant, or the real size of programs must be reduced as inflation erodes the purchasing power of fixed-dollar outlays.

Five-eighths of federal expenditures in fiscal year 1975 were for programs that are adjusted automatically for increases in the price level. Programs such as social security and federal employee retirement with explicit cost-of-living provisions represented 27.6 percent of total outlays, while programs that are adjusted on a cost basis (like medicare), or by less rigid indexation provisions (such as federal pay) make up an even larger share (35 percent) of federal expenditures. Apart from the effect of inflation on the rate of interest, the automatically adjusted part of expenditures is indexed on an approximately one-for-one basis; that is, a 1 percent increase in the price level induces an automatic 1 percent increase in these expenditures. Since these expenditures comprise about five-eighths of the total, a 1 percent increase in the price level induces about a 0.6 percent automatic increase in total federal expenditures.

This is not to say that the other three-eighths of the federal budget is necessarily eroded by inflation. Spending on a large majority of these "nonindexed" programs has increased fast enough to leave their real size constant. This indicates that programs can be adjusted for inflation on a discretionary basis as well as automatically. If these likely discretionary changes are included in the response of federal expenditures to inflation, then a 1 percent increase in the price level results in a 1 percent increase in current dollar federal expenditures.

(IX)

The automatic response of expenditures to increases in the price level is less than the automatic response of tax receipts to these same increases. A 1 percent increase in the price level generates an automatic 0.6 percent increase in expenditures, but an automatic 1.2 percent increase in tax revenues. Thus inflation automatically reduces the federal deficit or increases the surplus, since automatic tax increases are not fully offset by automatic expenditure increases.

INTRODUCTION

In the past 10 years, inflation has become a fact of life in the United States. Prices have risen sharply, accelerating the growth of expenditures on most commodities and services. Federal expenditures have also grown rapidly; the rate of increase in spending on some programs has surpassed the rate of inflation, but has been less than the inflation rate for others.

These effects of inflation on federal expenditures are the focus of this study. The discussion is aimed at four main questions: First, how do the prices of federal government expenditure items change when the price level changes? In this analysis, price increases for particular federal expenditure categories are related to increases in the overall price level, which is measured by the Consumer Price Index (CPI). If the price level (CPI) increases by 1 percent, then the price for a particular federal purchase should increase by some percentage also. The percentage increase in the price of a federal purchase resulting from a 1 percent increase in the CPI will be called the "inflation sensitivity" of that purchase.¹ If all prices went up at exactly the same rate, the inflation sensitivities would always be 1.0. In fact, some prices go up much faster than the CPI during inflationary periods, while others lag behind and catch up later. This response is measured by the "inflation sensitivity" estimates that are reported in this paper.

1. In mathematical terms, an "inflation sensitivity" is measured by the coefficient β in the linear equation: (percent change in price) = $\alpha + \beta \cdot$ (percent change in CPI) + (residual term). α measures the trend in price relative to the CPI ($\alpha > 0$ means that the price under consideration rises faster than the CPI when $\beta=1$), while the residual term is composed of price changes that cannot be attributed to either trend or changes in the overall price level.

The second question is which programs are indexed for inflation and what is the effect of this indexation? The term "indexation" means explicit legal recognition of inflation and provision to counter its effect by automatic cost-of-living escalators. Thus social security payments are indexed, since benefits are automatically increased with CPI increases; but federal highway construction is not indexed, because outlays are not increased explicitly when the price index for highways goes up.

Third, what has happened to real expenditures during periods of high inflation? Here the analysis is largely historical and descriptive rather than analytical. This is necessarily the case, for if real expenditures decrease in inflationary times, it is hard to say whether this decrease was caused by inflation or by a discretionary choice on the part of the government. Expenditure information on major programs is given in Appendix A, along with estimates of how prices in these programs have behaved in comparison to the CPI.

Fourth, which federal programs tend to gain and which tend to lose during inflationary times? Chapter IV addresses this question. Not surprisingly, indexed programs have fared better than nonindexed ones during the recent inflation. However, much of the increase in indexed programs has been due to increases in the number of people served rather than increases in individual benefits.

In this study, the relationship between federal expenditures and inflation is studied in one direction only; namely, the change in spending that is caused by an increase in the price level, as measured by the CPI. This rise in the price level increases the prices of the goods and services that the federal government buys. Because of these increases, many categories of federal spending automatically rise. While it is true that there is causation in the other direction as well--higher federal spending can cause price increases, the effect of spending on prices is not the subject of this study. Thus, only one part of the political and economic system that generates inflation is examined.

To some extent, the results of any study about the effects of inflation depend on the type of inflation that is assumed to occur. It would be unrealistic to assume that all prices go up at exactly the same rate; during

inflationary periods in the past, some prices have gone up much faster than others. The type of inflation that is assumed throughout this study is one of a general increase in the price level, accompanied by the average changes in relative prices that have occurred in the recent past. Thus, the prices of some items, such as medical care and highway construction, are found to increase faster than the overall rate of inflation as measured by the CPI, while other prices rise more slowly than the CPI. These findings are implicit in the regression analyses of various price indices in Appendix A.

Table 1 gives the assumptions about the rate of price increase of various components of federal expenditure relative to the CPI. Most of the classifications listed in Table 1 were derived by looking at the behavior of these prices over the past 25 years.

In general, then, the characteristics of the inflation assumed in this analysis are very similar to the average behavior of prices during the last 25 years.

TABLE 1

RATES OF PRICE INCREASES FOR VARIOUS COMPONENTS
OF FEDERAL EXPENDITURES RELATIVE TO CPI

- A. Faster than the CPI:
1. Highway construction
 2. Sewer construction
 3. Medical care
 4. Fuel (petroleum and natural gas)
 5. Wages (not adjusted for productivity increase)
 6. Federal purchases of goods^a
- B. About the same as the CPI:
1. Non-residential structures
 2. Commodities purchased by poor persons
 3. State and local government purchases
 4. Educational services
 5. Food
 6. Wages (adjusted for productivity increase)
- C. Slower than the CPI:
1. Producers durables
 2. Housing^b

a. This category overlaps other entries in this table to some degree.

b. As measured by the Bureau of Economic Analysis (BEA) personal consumption deflator for housing. The rent component of the CPI also increases more slowly than the overall CPI, although the home ownership component does not.

THE AUTOMATIC RESPONSE OF FEDERAL EXPENDITURES TO INFLATION

The 27 programs discussed on a program-by-program basis in Appendix A are grouped in this section by legal status with respect to inflation. The first classification is indexed programs, which are governed by an explicit cost-of-living escalator clause. The second classification is "quasi-indexed" programs, which have variable or less explicit escalator clauses, or where outlays are determined on a cost-sharing basis. The third classification (non-indexed programs) includes all programs for which inflation adjustments are strictly discretionary.

Indexed Expenditures

A large portion of federal expenditures are for entitlement programs which have explicit cost-of-living escalator clauses built into them. The largest of these programs is social security (Old Age, Survivors, and Disabled Insurance Trust Funds--OASDI). Others that are discussed in Appendix A include civil service and military retirement, supplemental security income (SSI), food stamps, railroad retirement, and the school lunch program. Other smaller programs, such as payments to coal miners for black lung disease and meals-on-wheels for the elderly are indexed, but comprise such small outlays that they are not discussed separately.¹

The indexation scheme for federal civilian retirement and military retired pay is constructed so that it overcompensates for inflation. When the CPI goes up more than 3 percent, benefits are increased the full CPI increase

1. For a list and short discussion of all federal programs with explicit escalator clauses, see: Automatic Cost of Living Increases in Federal Programs, OMB Technical Paper Series BRD/FAB 75-2 (July 30, 1975).

plus 1 percent. The 1 percent "kicker" was added to compensate for the time lag in benefit increases, but since it is a permanent increase, it always overcompensates retirees during inflationary times. However, the progressivity of the individual income tax decreases the over-indexation of federal retirement to some degree.

OASDI and railroad retirement are overindexed for persons who are not yet retired, because the proportion of average wages paid in benefits is indexed. In 1976, a worker earning \$1,000 a month at retirement might be eligible for social security benefits of \$400 per month. In 1990, if the price level had doubled, the same sort of worker would be making approximately \$2,000 per month at retirement, but would be eligible for more than \$800 per month benefits, because under present law the proportion of average wages allowable as benefits (0.4 in the 1976 example) increases with the inflation rate. This aberration in the law, usually called the "coupling" problem, is a serious defect that must be corrected if even moderate rates of inflation persist in the future. At high rates of inflation, coupling could eventually generate social security benefits that are higher than earned income.

For persons already retired, OASDI and part of railroad retirement are correctly indexed, except for a lag, since benefits are increased by the full CPI percentage increase over a year. Food stamps are indexed using the CPI food-at-home component, and federal payments for the school lunch program are adjusted by the CPI food-away-from-home index. Federal payments for SSI are adjusted for inflation in the same way and at the same time as OASDI, but increases may not be paid to recipients, since states have the option of subtracting the increase from their share, leaving combined payments constant.

As has been previously discussed, one of the main focuses of this study is the determination of the "inflation sensitivity" of federal expenditures. That is, if the inflation rate as measured by the CPI is 1 percent higher, how many percentage points higher will federal expenditures automatically be in current dollar terms? Table 2 gives fiscal year 1975 outlays and inflation sensitivities for the seven major indexed programs in the federal budget.

Although part of railroad retirement is underindexed, the overindexation of federal retirement gives the part of the federal budget which is explicitly indexed an inflation sensitivity of 1.04. The overall average inflation sensitivity is very close to 1 because OASDI benefits comprise most of the total, and it has been assumed that the inflation sensitivity for OASDI is 1.0. The overindexation for workers who have not yet retired is ignored because it has only a small effect in the short run. Over a period of decades, however, the inflation sensitivity of OASDI would exceed 1.0.

TABLE 2

INDEXED PROGRAMS: BUDGET PERCENTAGES FOR
FISCAL YEAR 1975 AND INFLATION SENSITIVITY ESTIMATES

	<u>1975 Outlays (billion \$)</u>	<u>1975 Outlays as Percent of Total</u>	<u>Inflation^a Sensitivity</u>
Social Security (OASDI)	62.5	19.3 %	1.00
Supplemental Security Income (SSI)	4.2	1.3 %	1.00
Railroad Retirement	3.1	1.0 %	.75
Federal Civilian Retirement	7.1	2.2 %	1.30
Military Retired Pay	6.3	1.9 %	1.30
Food Stamps	4.4	1.3 %	1.00
Nutrition Program	2.1	0.6 %	1.00
 Total Indexed	 89.7	 27.6 %	 1.04

a. This is the inflation sensitivity after 2 years. The inflation sensitivity of some of these programs may be almost zero in a time interval of a year or less, due to the lags in some indexation schemes, such as social security which represents a large proportion of the indexed programs.

Quasi-Indexed Expenditures

Some federal programs, while not explicitly indexed by a cost-of-living escalator, are implicitly indexed because payments are based on items whose prices increase with the price level. Medicare, where payments are determined on a cost basis, is an example of this. Pay for most federal workers has an explicit escalator based on a pay survey of comparable private industry jobs, but this escalator can be (and has been) changed by action of either the executive branch or the Congress. Debt service payments (interest) on the national debt are very sensitive to inflation through the response of the interest rate to the expectation of future inflation. Unemployment insurance (UI) payments are based on earnings and may be expected to increase when prices, and therefore wages, increase.

Table 3 gives inflation sensitivity estimates for quasi-indexed expenditures and the size of these expenditures in the fiscal year 1975 budget. The price of medical care increases faster than the CPI, and more rapid inflation increases medical care prices on a one-for-one basis. Federal pay and unemployment insurance components have short-run and long-run sensitivities which are estimated from data on average hourly earnings in the private sector. In the short run, wages tend to lag behind the inflation rate, but usually catch up within three years.

The estimates of the current dollar inflation sensitivity of interest payments are very high because the rate of inflation has a direct impact on the rate of interest, which is the price the government pays for debt service. In the long run, a sustained increase of one percentage point in the rate of inflation increases the rate of interest by the same amount. In 1975, the cost of borrowing for the government averaged a little above 7 percent, and an increase of one percentage point would, therefore, raise the interest rate to 8 percent, increasing costs by $1/7$ or 14 percent. Hence the long-run inflation sensitivity estimate is 14.0 in Table 3.

TABLE 3

QUASI-INDEXED PROGRAMS: INFLATION SENSITIVITIES
AND BUDGET PERCENTAGES FOR FISCAL YEAR 1975

	1975 Outlays (billion \$)	1975 Outlays as Percent of Total	Inflation Sensitivity ^a
Medicare	14.5	4.5 %	1.00
Medicaid	6.7	2.1 %	1.00
Veterans' Medical Care	3.4	1.1 %	1.00
Unemployment Insurance	13.5	4.1 %	.75 - 1.00
Federal Civilian Pay	29.7	9.1 %	.75 - 1.00
Military Pay	25.0	7.7 %	.75 - 1.00
Offshore Oil Lease Receipts	-2.4	-.7 %	1.00
Net Interest	23.3	7.2 %	2.8 - 14.0
(Inflation Premium in Interest Payments Excluded)	--	--	(1.00)
Total Quasi-Indexed	113.6	35.0 %	1.22 - 3.67
(Inflation Premium in Interest Payments Excluded)	--	--	(.85 - 1.00)

a. When two inflation sensitivity estimates appear, the first is the short-run (2 year) sensitivity, while the second is the long-run (3 or more years) sensitivity.

In the short run, this high sensitivity is lowered by two factors: First, it takes a long time for inflation rates to be fully reflected in interest rates. Only if and when both borrowers and lenders expect the higher inflation rate to be continued in the future is the interest rate fully compensated for inflation.

Second, much of the public debt consists of long-term bonds that mature in three to five years or even longer. If the interest rate increases, the interest cost to the government increases only on those bonds which mature and whose principal must be paid from the proceeds of a new issue.² Bonds that do not mature do not need to be rolled over, and the interest cost on these bonds remains constant in current dollars. Since the market rate of interest has risen, holders of long-term government bonds suffer a capital loss when the interest rate increases; such a holder must sell the bond for less than its face value if he wants to sell it before its maturity date. This loss to long-term creditors can be considered a gain to long-term debtors like the federal government; only the original coupon rate on long-term bonds must be paid instead of the new higher market rate of interest. A fall in the interest rate generates the opposite effect: gains for long-term creditors and losses for long-term borrowers like the government.

If these capital gains on the public debt are counted, then the inflation sensitivity of interest payments is 1.0, the alternative estimate in Table 3. This estimate is derived from the assumption that the real rate of return on investment remains constant. If the rate of inflation increases by 1 percent, the interest payment (over and above compensation for inflation in the payment of principal) must increase 1 percent per year to keep the real rate of return constant.

In some sense this estimate is less misleading than the estimate of 14. When the inflation rate increases;

2. This process of paying off an old issue with the revenues of a new bond sale is called "rolling over" the old bonds.

debt service payments on new issues skyrocket, but most of this increase is an inflation premium which is offset by capital gains on the debt. As can be seen in Table 3, the inflation sensitivity of quasi-indexed programs is much higher in current dollar terms than it is when capital gains on the public debt are included. Taking account of capital gains and losses on the national debt, incidentally, would lead to a new definition of a balanced budget: one in which the real debt is held constant. Inflation premiums in debt service payments could be counted as payments on the real debt rather than as expenditures.

Nonindexed Expenditures

With the exception of a few small programs, all other expenditures by the federal government are adjusted for inflation by discretionary actions of the Congress. Since this study calculates the effects on expenditures that will automatically take place when the inflation rate increases, the inflation sensitivity of these programs is zero. This is not to say that inflation does not affect these programs; instead, it says that inflation does not affect current dollar outlays for these programs through provisions in current law. In Chapter IV, where trends in real expenditures are analyzed, it is shown that, in spite of the absence of automatic adjustment, many nonindexed programs keep pace with inflation through year-to-year changes in appropriations.

Total Expenditures

The inflation sensitivities given in Tables 2 and 3 are aggregated in Table 4. In the short run, the automatic response of expenditures to increases in the price level is considerably less than 1-for-1. A 1 percent increase in the price level can be expected to automatically increase expenditures by 0.71 percent in purely nominal terms, or 0.58 percent if capital gains on the debt are included. In the long run, the high sensitivity of debt service payments to inflation alters this result: a 1 percent increase in the price level can be expected to automatically

increase nominal federal expenditures by 1.57 percent. Most of this increase, however, is due to substantial inflation premiums that may be conceptualized as reducing the real public debt. If these premiums are excluded, the long-run automatic reaction to a 1 percent increase in the price level is a 0.63 percent increase in expenditures.

TABLE 4
INFLATION SENSITIVITY OF TOTAL FEDERAL EXPENDITURES
AND SUB-AGGREGATES FOR FISCAL YEAR 1975

	1975 Outlays (billion \$)	1975 Outlays as Percent of Total	Inflation Sensitivity ^a
Indexed Programs	89.7	27.6 %	1.04
Quasi-Indexed Programs	113.6	35.0 %	1.22 - 3.67
(Inflation Premium in Interest Pay- ments Excluded)	--	--	(.85 - 1.00)
Nonindexed Programs	121.3	37.4 %	0
Total	324.6	100.0 %	.71 - 1.57
(Inflation Premium in Interest Pay- ments Excluded)	--	--	(.58 - .63)

a. The first figure is the short-run (2 year) sensitivity while the second figure is the long-run (3 years or more) sensitivity.

COMPARISON OF THE INFLATION SENSITIVITY OF EXPENDITURES TO THE INFLATION SENSITIVITY OF REVENUES

The problem of federal revenues that increase more than proportionately with current dollar income is a well-known one. In the context of real growth without inflation, it has been called the problem of "fiscal drag": If current dollar GNP grows by 5 percent, federal revenues may grow by 6 percent, thus taking a larger than proportionate bite out of aggregate demand. This increasing tax bite acts as a "drag" on economic growth.

Since tax revenues are usually levied in current dollar terms, this "fiscal drag" applies to growth in current dollar income caused by inflation as well. If the price level goes up 10 percent, and a worker increases his gross wages by the same percentage, his real take-home pay will decline, since he has moved into a higher tax bracket. In the terminology used earlier, personal income taxes are overindexed.

Although the overindexation of taxes is a large and interesting topic, it is not the subject of this report. Estimates of the inflation sensitivity of federal revenues have been derived by other authors; these estimates will be compared to the inflation sensitivity of federal expenditures to arrive at an overall picture of the effect of inflation on the federal budget.

A reasonable set of inflation sensitivities for federal revenues is given by Edward Gramlich in his unpublished paper, "The Economic and Budgetary Effects of Indexing the Tax System."³ These estimates, with some modifications, appear in Table 5. The estimated overall current dollar sensitivity of tax receipts to inflation is 1.27 in the short run and 1.50 in the long run, with the short-versus long-run differences again being generated by the

3. Edward M. Gramlich, The Economic and Budgetary Effects of Indexing the Tax System, unpublished paper prepared for the Brookings Conference on Inflation and the Tax System (October 1975).

TABLE 5
INFLATION SENSITIVITY OF FEDERAL RECEIPTS
FISCAL YEAR 1975

	1975 Receipts (billion \$)	Percent of Total 1975 Re- ceipts	Inflation Sensitivity
Personal Income Taxes	122.4	43.6 %	1.55 ^a
Corporate Profits Taxes	40.6	14.4 %	1.35 ^b
Social Insurance Taxes	79.7	28.4 %	1.00
Other Taxes	32.5	11.6 %	0.47 ^b
Deposit of Federal Re- serve Earnings (nominal)	5.8	2.1 %	2.8-14.0 ^{c&d}
(Inflation Premiums in the Fed Payment Excluded)	--	--	(1.0)
Total (nominal)	281.0	100.0 %	1.27-1.50 ^d
(Inflation Premiums in the Fed Payment Excluded)	--	--	(1.23)

a. Obtained from: Joseph Pechman, "Responsiveness of the Federal Individual Income Tax to Changes in Income," Brookings Papers on Economic Activity, (2:1973), pp. 385-421.

b. Obtained from: W. Fellner, K. Clarkson and J. Moore, Correcting Taxes for Inflation, (Washington: American Enterprise Institute, 1975).

c. See the section on Net Interest in Appendix A for a full discussion of these sensitivity estimates.

d. As in Tables 3 and 4, the first figure in a range is the short-run (2 year) inflation sensitivity, while the second figure is the long-run sensitivity (3 or more years).

sensitivity of interest rates to inflation. If inflation premium payments are not included in the receipts from the Federal Reserve System (Fed), the inflation sensitivity is 1.23.

A comparison of inflation sensitivity of total expenditures with the inflation sensitivity of total receipts is given in Table 6. The results when inflation premiums are excluded are easy to interpret: If inflation premiums built into debt service payments are not counted, receipts are much more sensitive to inflation than expenditures, so that an increase in the price level increases receipts relative to expenditures if other real quantities remain constant. In the short run, this differential is widened by the lagged response of wages to inflation. Thus, when interest payments are excluded from consideration, the inflation sensitivity estimates confirm the "conventional wisdom" about the automatic response of receipts and expenditures to inflation. A 10 percent increase in the price level will increase expenditures by 5.8 percent in the short run and 6.3 percent in the long run, while increasing receipts by 12.3 percent in both the short and long run. This differential is the previously mentioned "fiscal drag".

TABLE 6

INFLATION SENSITIVITY OF TOTAL FEDERAL
EXPENDITURES AND RECEIPTS

A.	Nominal Inflation Sensitivities--Inflation Premiums in Debt Service Payments Not Excluded	
	Federal Expenditures	0.71 - 1.57 ^a
	Federal Receipts	1.27 - 1.50 ^a
B.	Inflation Sensitivities--Inflation Premium in Debt Service Payments Excluded	
	Federal Expenditures	0.58 - 0.63 ^a
	Federal Receipts	1.23

a. The first of these figures is a short-run (2 year) sensitivity, while the second figure is the sensitivity in the long run after wages and interest rates have had time to adjust for the rate of price increase.

If the budget is considered in strictly current dollar terms, the gap between the automatic inflation response of expenditures and receipts is narrowed. In the short run (about one year), due to the long lag in response of interest rates to the inflation rate, a 10 percent increase in prices would generate a 7.1 percent current dollar increase in expenditures and a 12.7 percent current dollar increase in receipts. In the long run (10 years or more) the automatic response to a 10 percent price increase rises to 15.7 percent on the expenditures side and 15.0 percent on the receipts side. This increase in response to inflation and consequent decrease in the difference in sensitivities are due exclusively to the response of interest rates to price increases.

However, as was pointed out earlier, the increase in current dollar expenditures on debt service is an increase in the inflation premium built into the rate of interest. This inflation premium can more reasonably be thought of as a payment on the real public debt (which is shrinking relative to the debt in current dollar terms due to inflation) rather than an expenditure. From this viewpoint, increases in the price level automatically increase revenues much faster than they increase expenditures. Even in current dollar terms, inflation increases revenues immediately, while expenditures take a longer time to increase to their new levels.

THE EFFECTS OF INFLATION ON NONINDEXED PROGRAMS

In the previous two sections, the automatic impacts of inflation on the budget were analyzed. The inflation sensitivity of expenditures that are not tied to costs or price indices was assumed to be zero; this is correct in terms of current law. However, the absence of automatic adjustment for these programs does not mean that constant dollar spending on them necessarily falls in the presence of inflation. It simply means that adjustments for inflation must be made on a discretionary basis rather than automatically.

Over the last five years, however, constant dollar spending on nonindexed programs has declined. Table 7 shows the details by major program.

TABLE 7

REAL EXPENDITURES: TEN NONINDEXED PROGRAMS,
FISCAL YEARS 1971 - 75
(Billions of 1972 dollars)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Defense Purchases	39.7	37.0	32.4	32.1	29.4
Veterans' Compensation	6.1	6.2	6.4	5.9	6.1
G.I. Bill	1.7	2.0	2.6	2.9	3.6
AFDC	3.2	3.7	3.7	3.6	3.6
Employment and Training	2.1	3.0	3.2	2.6	3.3
Housing Payments	0.8	1.1	1.6	1.6	1.8
Elementary and Secondary Education	3.9	4.1	3.6	3.5	4.0
Higher Education	1.6	1.5	1.5	1.3	1.7
EPA Construction Grants	0.6	0.4	0.7	1.4	1.4
Highway Construction	5.0	4.8	4.6	3.5	3.2
Total	64.7	63.8	60.3	58.4	58.1

This decline in real spending is more than accounted for by two categories: defense purchases and highway construction. The aggregate for the other eight programs actually increased slightly in real terms. Defense purchases are always subjected to close scrutiny by all parties to the budgetary process; it is likely that most of the decline in real defense spending was deliberate choice and not accidental erosion due to inflation. Highway outlays come from a trust fund that has remained relatively constant in current dollar terms. Inflation has eroded expenditures on highway construction; at lower rates of inflation, the interstate highway system would be completed sooner.

The other eight programs provide evidence that a program need not be indexed to keep pace with inflation. The strong showing of nonindexed programs during the inflationary period of the early seventies demonstrates that the federal budgetary process can adjust to inflation without indexation. This observation is at variance with the widely held notion that nonindexed programs necessarily lose ground to indexed programs during inflationary times.

TRENDS IN REAL FEDERAL EXPENDITURES, 1971-1975

Federal expenditures increased in real terms over the five-year span from 1971 to 1975. The Office of Management and Budget has estimated that this increase was 14.1 percent, or 3.35 percent per year.⁴ CBO's estimate for this increase, using a more disaggregated approach and different methodology, is 13.8 percent, or 3.28 percent per year. More interesting than the aggregate figure, however, is a breakdown of real increases among different categories of spending. One possible disaggregation is given in Table 8.

TABLE 8

COMPOSITION OF REAL FEDERAL SPENDING,
FISCAL YEARS 1971 - 75
(Billions of 1972 dollars)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
National Defense	82.8	79.2	73.1	70.9	69.6
Benefit Payments for Individuals	77.9	86.7	93.6	99.8	114.6
Other Grants to State and Local Governments	18.8	21.6	28.0	25.7	26.6
Net Interest	16.0	16.3	16.5	15.5	16.0
Other Federal Opera- tions	27.5	32.7	29.5	27.5	30.4
Total	228.8	236.5	240.7	239.4	257.2

4. Office of Management and Budget, The United States Budget in Brief, Fiscal Year 1977, January 1976, p. 67.

Over the 1971-1975 period, real defense spending fell 16.6 percent, due partly to the end of the Vietnam War effort. This real spending decrease was more than replaced by increased real payments for individuals, which rose 44 percent during the same period. However, more than two-thirds of this increase in real benefits was due to increased numbers of beneficiaries. For example, real food stamp outlays increased 99 percent from fiscal year 1971 to fiscal year 1975. During the same period, real per person monthly benefits rose only 9 percent, with the other 90 percent caused by increased participation.

The most significant cause of real increases in benefits per person was the change in the social security law in 1972, which increased benefits by 20 percent and liberalized benefits for widows. Another (much smaller) contribution to the rise in real benefits per person was the "1 percent kicker" in the federal retirement indexation scheme.

Grants to state and local governments increased 42 percent, largely due to the initiation of the general revenue sharing program. "Other federal operations," which consists primarily of compensation of federal employees, remained remarkably constant. Federal civilian employment remained very stable over the five-year span.

Although spending on indexed programs increased much faster in real terms than spending in nonindexed programs, a large share of these increases was due to increased numbers of persons eligible for these programs as noted above. Overall, real spending patterns over the 1971-1975 period seem to reflect an increased concern for the poor and the elderly and decreased emphasis on national security.

CONCLUSION

The findings of this study have confirmed some widely held beliefs about the reaction of federal expenditures to inflation, but have contradicted others. As expected, the automatic reaction of expenditures to inflation is smaller than the automatic reaction of revenues to inflation. More than 60 percent of all federal expenditures increase explicitly with prices or implicitly through cost payments tied to the price level. Since the prices of these expenditure items rise on an approximately one-for-one basis with the CPI, an extra one percent increase in the price level automatically causes about a 0.6 percent increase in federal expenditures.

Since almost all taxes are levied in current dollar terms, almost all tax receipts are directly affected by inflation. When the progressivity of income, profits, and estate taxes is also considered, it is estimated that an extra 1 percent increase in the price level will bring about an automatic 1.2 percent increase in tax revenues. These figures imply an automatic tendency of the budget toward surplus during inflationary times, as rising prices increase revenues more than expenditures.

The expenditure item that is most sensitive to the inflation rate is the debt service payment. If the rate of inflation is expected to be one percentage point higher, this percentage point should be directly added to the interest rate, increasing debt service payments by much more than one percent. Although this line of reasoning might indicate that the government's debt service costs are boosted enormously by inflation, actually the reverse is true in real terms. The reaction of the rate of interest to the rate of inflation is slow, a fact which produces gains for all debtors (including the federal government) during inflationary times.

The analysis of automatic reactions might seem to imply that programs with no adjustment for inflation shrink in real terms as the price level rises. This is

not the case: Eight out of eleven nonindexed programs kept pace with inflation during the 1971-75 period through the process of year-to-year discretionary adjustments. The notion that a program must be indexed in order to keep pace with inflation is incorrect. The idea that program spending can be discretionarily adjusted as well as it can be adjusted by formula has probably been clear to veteran observers of the budgetary process, but may come as a surprise to the less informed.

APPENDIX A

In this appendix, expenditures on 26 programs and a residual category are each examined in turn. Expenditures for fiscal years 1971-75 are examined as totals for the program and on a per individual basis in the case of entitlement programs.¹

Price indices or deflators for most of the 27 expenditure categories are also examined. The general methodology is to fit a linear equation of the following form to annual data since 1947 (if available):

$$\text{percent change in price index} = \alpha + \beta \cdot (\text{percent change in CPI})$$

The constant coefficient α measures the trend in price change for the expenditure relative to the CPI. If α is positive, the relative price of the commodity is increasing. The slope coefficient measures the marginal percentage change in the price index associated with a 1 percent increase in the CPI. β is called the inflation sensitivity for the expenditure category under consideration. In cases where leads and lags were suspected, a more complicated relationship between price and (past, current, and future) CPI changes was estimated.

Note that the above equation measures the contemporaneous relationship between changes in the price of a particular commodity and changes in the CPI; that is, current price changes are related to current CPI changes.

1. Most of the data reported are from the 1977 Budget, the Bureau of Labor Statistics, or the Department of Commerce. Other sources are referenced. Unless noted, real quantities (in 1972 dollars) are derived by dividing current dollar amounts by the reported price index.

If changes in the price of the commodity come before or after changes in the CPI, the contemporaneous relationship may be seriously misspecified.

Since the price index regressions are over the period from 1947 to 1975 wherever possible, the type of inflation assumed in the study is the average type of inflation over the 1947-1975 period. Before 1970, increases in the price level were diffused across many sectors of the economy; relative prices stayed fairly constant. The inflation since 1970 is of a different variety, generated in large part by increases in food and fuel prices. Devaluation of the dollar also helped push the price level up. The estimations presented in this appendix are dependent on the type of inflation that has occurred in the past; the less typical any future inflation is, the less applicable will be the results. A worldwide drought would generate large increases in the price of food, and probably increases in the overall price level. This sort of price increase in one sector would not be like the average inflation over the past twenty years; therefore, the results in this study would be less applicable than the case where the overall price level rose and relative prices stayed constant.

1. Social Security (OASDI)

Social security benefits for persons already retired or disabled are indexed by the CPI; in each year, if the CPI in the first quarter is 3 percent higher than in the first quarter of the previous year, then benefits are increased by the same percentage in July. Benefits are, therefore, correctly indexed if it is assumed that the CPI measures the cost of living for social security recipients, except for the small losses due to the lag in benefit increases. Increases in benefits paid in the last five years have been due not only to this indexation, but also to growth in the number of beneficiaries and increases in the real wage base. Table 1A gives real and current dollar figures for OASDI benefits in the past five years.

TABLE 1A

SOCIAL SECURITY (OASDI) CASH BENEFIT PAYMENTS
FISCAL YEARS 1971-75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	34.5	38.6	47.3	54.0	62.5
Real Outlays (billion 1972 \$)	36.3	39.2	46.2	48.4	50.4
Consumer Price Index (CPI, CY1972=100)	95.0	98.4	102.4	111.5	123.9
Number of Recipients (millions of persons)	26.2	27.3	28.5	29.9	30.8
Average December Benefit per Retired Worker ^a (\$)	118	132	162	166	188
Real Average December Benefit per Retired Worker (1972 \$)	124	134	158	149	152

a. From the Social Security Bulletin, quarterly tables.

The increase in real benefits from fiscal year 1972 to fiscal year 1973 was a legislated increase; the decline in fiscal year 1974 was due to a lag in the beginning of indexation.

All the above analysis ignores the overindexation of future benefits for workers who have not yet retired. These liabilities of the social security system are doubly indexed because wages increase with the price level, while

benefits rise more than in proportion to wages because the formula that fixes benefits as a percentage of average wages is also indexed. There are various ways of altering the indexation of the formula which would eliminate the double indexation of future social security benefits.

2. Supplemental Security Income (SSI)

SSI is a federal welfare program which pays benefits to aged, blind, and disabled Americans. SSI payments on the federal level are indexed in the same manner as OASDI payments: In the first quarter of each year, if the CPI has increased 3 percent or more over the CPI in the base quarter, benefits are increased by the percentage increase in the CPI, and the first quarter of the year becomes the new base quarter. Thus, federal payments for SSI are correctly indexed except for a lag effect that may be more than one year long if the inflation rate is low.

Recipients might not receive the full increase, though, because many states elect to make a supplementary payment on top of the federal payment. If the federal payment increases, but these states decide to leave the total payment constant, the indexation could just save the states money rather than increase recipient benefits.

Federal SSI payments for fiscal years 1971-75 are given in Table 2A. Outlays in 1971-1973 are for the federal share of state programs which SSI replaced in January 1974.

TABLE 2A

FEDERAL EXPENDITURES FOR SSI
AND PREDECESSOR PROGRAMS
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.66	1.75	1.83	2.88	4.23
Real Outlays (billion 1972 \$)	1.75	1.78	1.79	2.58	3.41
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Number of Recipients (millions of persons)	3.06	3.15	3.16	3.22	3.99
Real Federal Payment per Recipient (1972 \$)	572	565	566	801	855

Real federal expenditures per person increased quite sharply after the SSI program became effective in 1974, and the number of recipients increased in fiscal year 1975. Further increases in the number of recipients are expected over the next five years. Since SSI expenditures are indexed by the CPI, their inflation sensitivity is 1.0.

3. Railroad Retirement

The federally operated retirement system for railroad employees consists of two parts: a mandatory part that is very similar to the OASDI system in terms of payments and benefits, and a supplemental part based partially on employee contributions. Since payments under the mandatory part of the program are based on OASDI formulas, these benefits are indexed approximately correctly for retired workers, and overindexed for persons in the system that are still working.

TABLE 3A

RAILROAD RETIREMENT EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.9	2.1	2.5	2.7	3.1
Real Outlays (billion 1972 \$)	2.0	2.1	2.4	2.4	2.5
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Number of Recipients (millions of persons)	.99	.99	.99	.99	1.02
Real Expenditure per Recipient (1972 \$)	2020	2120	2420	2420	2450

Real expenditures per recipient have increased over the 1971-1975 period, due to increased real wage experience and the 20 percent social security increase in fiscal year 1973 which affected the mandatory part of railroad retirement. The estimate of 0.75 for the inflation sensitivity in the text is derived from the fact that only the mandatory half of benefits are fully indexed. Smaller cost-of-living adjustments have been legislated for the voluntary half of the program.

4. & 5. Civil Service and Military Retirement

These two federal retirement programs are discussed together because the indexation scheme for them is virtually identical. Benefits for each program are automatically increased when the CPI goes 3 percent above its level in the base period and maintains the 3 percent higher level for three consecutive months. The highest of these three months is defined as the new base period, and benefits are increased by the CPI from the old base period to the new one plus 1 percent. The benefit increase becomes effective three months after the new base month is determined.

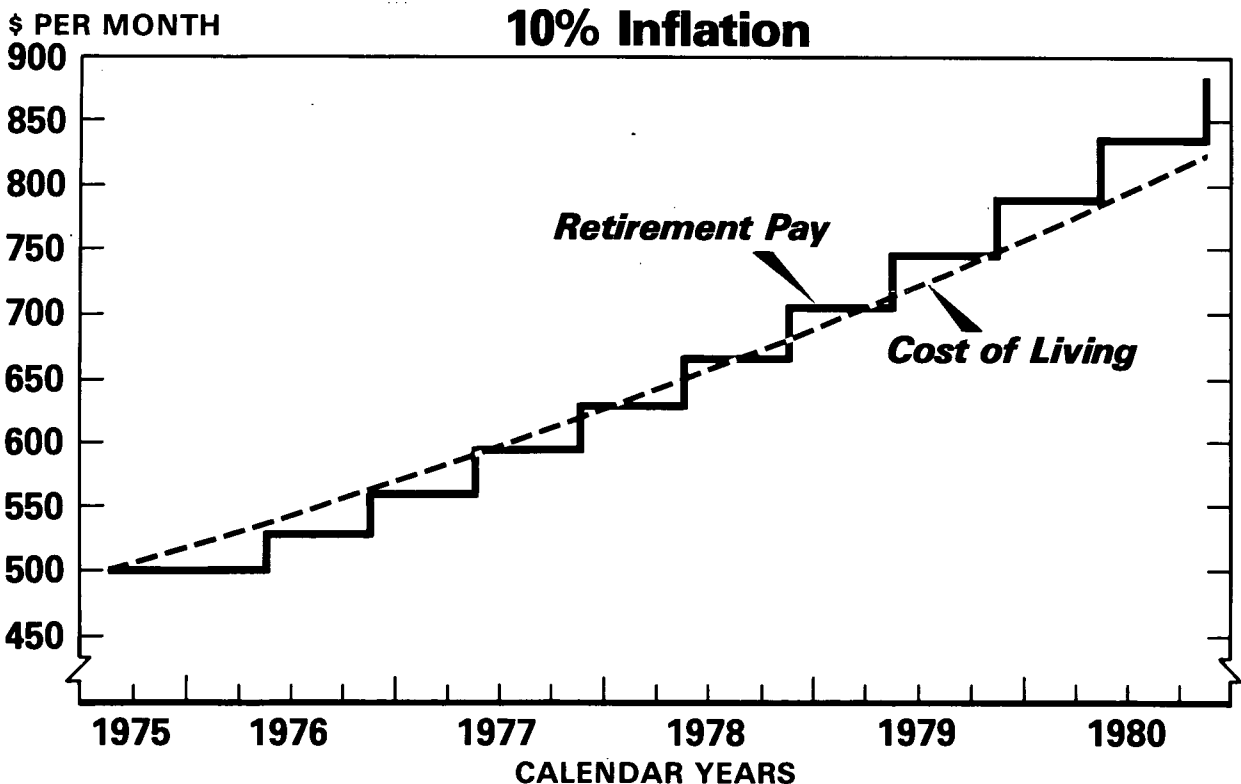
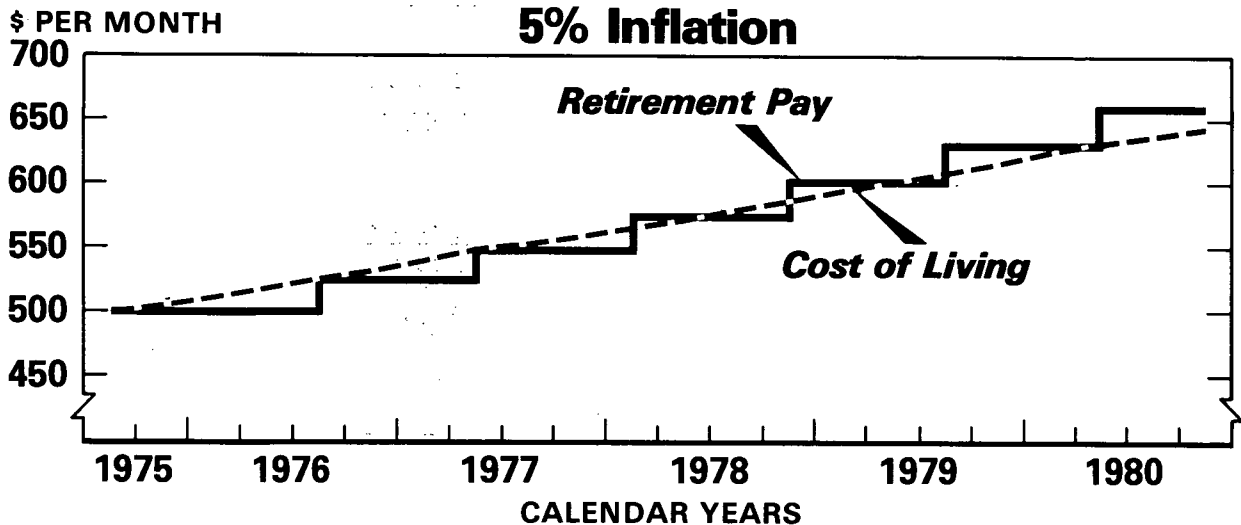
The "1 percent kicker" results in substantial over-indexation of federal retirement benefits when the inflation rate is high. Appendix Chart 1 illustrates this. At a rate of inflation of 10 percent per year, benefits are overindexed to a larger degree than they are at 5 percent per year. In the examples in Chart 1, the retiree entitled to \$500 a month in 1975 would be paid about \$200 more (in real 1975 dollar benefits) at a 10 percent rate of inflation than he would have received at 5 percent over the 1975-1980 period.

Tables 4A and 5A present the recent historical costs of the civil service and military retirement programs. These tables indicate that much of the increase in real expenditures for federal retirement are due to an increase in the number of retirees. Higher real incomes for recent retirees account for most of the increase in average monthly benefits. In the future, increased numbers of retirees and higher real wage histories for these retirees should increase expenditures for federal retirement.

Appendix Chart 1

Cost of Living vs. Federal Retirement Pay at 5% and 10% Rates of Inflation

(For a retiree entitled to \$500/month in July 1975)^{a/}



^{a/} Does not include effects of special provisions for the first post-retirement adjustment.

TABLE 4A

CIVIL SERVICE RETIREMENT EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	3.2	3.8	4.5	5.7	7.1
Real Outlays (billion 1972 \$)	3.4	3.9	4.4	5.1	5.7
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Beneficiaries (millions of persons)	1.03	1.17	1.28	1.34	1.39
Real Monthly Benefit per Beneficiary (1972 \$)	275	278	286	317	342

TABLE 5A

MILITARY RETIRED PAY
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	3.4	3.9	4.4	5.1	6.3
Real Outlays (billion 1972 \$)	3.6	4.0	4.3	4.6	5.0
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Beneficiaries (millions of persons)	.81	.87	.92	.98	1.05
Real Monthly Benefit per Beneficiary (1972 \$)	370	383	389	391	405

6. Food Stamps

The federal food stamp program allows low-income families to receive discounts on food purchases. A food stamp allotment (a certain dollar amount of food stamps per month) is determined by family size. The amount the family pays for the allotment (less than the redemption value of the stamps) is determined as a function of family income. The size of the allotment is based on the food-at-home component of the CPI, using weights for the USDA thrifty food plan. Thus, the program is approximately indexed but depends on recipient incomes as well as the inflation rate.

Outlays for fiscal year 1971 to fiscal year 1975 are given in Table 6A.

TABLE 6A

FOOD STAMP EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.52	1.80	2.13	2.72	4.38
Real Outlays (billion 1972 \$)	1.62	1.84	2.01	2.15	3.15
CPI Food-At-Home Com- ponent (CY1972=100)	94.3	97.7	105.8	126.5	138.9
Food Stamp Recipients (millions of persons)	9.4	11.1	12.2	12.9	17.1
Real Average Monthly per Person Benefit (1972 \$)	14.27	13.81	13.87	14.15	15.64

Real food stamp benefits per recipient remained approximately constant until fiscal year 1975, when both benefits and participation increased sharply. Falling real income and increased unemployment in the recession

was probably the cause for both these changes. Another cause was the initiation of the food stamp program in Puerto Rico.

For calculations of inflation sensitivity, it was assumed that food prices increase at the same rate as the CPI; the sharp increase in food prices since 1972 was viewed as a temporary phenomenon.

7. Nutrition Programs

Federal outlays for a number of nutrition programs are included under the National School Lunch Act, the Child Nutrition Act of 1966, and under Title VII of the Older Americans Act of 1965. These programs provide federal assistance for school lunches, school breakfasts, child care lunches and suppers, and congregate feeding programs.

These nutrition programs are automatically indexed: child nutrition programs are adjusted semiannually in January and July using the most recent six-month change in the food-away-from-home component of the CPI, while the major nutrition program for the elderly is adjusted annually using the same index.

Table 7A gives current dollar and real federal expenditures on these nutrition programs for fiscal years 1971-1975.

TABLE 7A

FEDERAL NUTRITION PROGRAM EXPENDITURES FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	.99	1.20	1.33	1.68	2.10
Real Outlays (billion 1972 \$)	1.06	1.22	1.30	1.46	1.64
CPI (food-away-from- home)(CY1972=100)	93.9	98.1	102.7	114.7	127.9

Spending on nutrition programs has kept ahead of inflation; recent revisions in the law indicate that this growth in real spending will continue. Comparison of the CPI food-away-from-home component (CPIFA) with the overall CPI yield the following results:

$$\begin{aligned} \% \Delta \text{CPIFA} &= 1.09 + 1.00 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 0.60 \\ \text{interval} &= 1953-1974 \end{aligned}$$

This indicates that the price of food away from home has increased faster than the overall cost of living; but that aside from this relative price shift, food prices have increased with the CPI on a 1-to-1 basis. Thus, the inflation sensitivity of nutrition expenditures was estimated to be 1.0.

8. Medicare

Medicare pays most of the cost of hospital stays for elderly and disabled Americans. Supplemental medical insurance, a voluntary program for those that are eligible for medicare, helps pay other medical costs, and adds to the overall cost of the medicare program. Historical costs for the medicare program are given in Table 8A.

TABLE 8A
MEDICARE EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	7.48	8.22	9.04	10.98	14.46
Real Outlays (billion 1972 \$)	8.22	8.40	8.85	10.13	11.60
Federal Medical CPI Composite (CY1972=100)	91.0	97.8	102.1	108.4	124.7
Eligible Beneficiaries ^a (millions of persons)	20.7	21.1	23.3	23.9	24.3
Real Expenditure per Eligible Beneficiary (1972 \$)	397	398	380	424	477

a. From the Office of the Actuary, Social Security Administration

The last line in Table 8A indicates that real medicare payments per person have gone up slightly in the 1971-1975 period; at least part of these gains offset losses during 1968-71.

The federal medical CPI composite (CPIFM) was constructed from the CPI medical services index and the CPI semi-private room index, with equal weights on each. This was done because the medical care paid for by the federal government has a much higher component of hospital care than medical services in the CPI.

The cost of medical care has increased much faster than the overall CPI. A regression of changes in CPIFM on changes in the CPI yielded the following results:

$$\begin{aligned} \% \Delta \text{CPIFM} &= 4.32 + .84 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 2.75 \\ \text{interval} &= 1956 - 1975. \end{aligned}$$

The large constant term in this equation implies that CPIFM went up about 4 percent per year faster than the CPI when the CPI rose slowly, but the coefficient of less than 1.0 on the changes in CPI implies that the gap between the changes in the two indices closed slightly during high rates of overall inflation. However, the estimated inflation sensitivity (.84) was not significantly different from 1.0, so 1.0 was used as the estimate.

9. Medicaid

Medicaid is a federal matching-funds program for providing medical care to the poor. The federal government pays a share of state health benefits that is inversely related to the average per capita income in the state. Currently, the federal share of all medicaid payments is about 55 percent. Table 9A gives federal expenditures for medicaid for fiscal years 1971-1975.

TABLE 9A

FEDERAL MEDICAID EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Federal Outlays (billion \$)	3.23	3.98	4.75	5.44	6.74
Real Federal Outlays (billion 1972 \$)	3.46	4.04	4.66	5.01	5.48
CPI Medical Services Index (CY1972=100)	93.4	98.4	101.9	108.5	122.9
Number of Recipients (millions of persons)	18.0	17.7	18.5	21.1	22.5
Real Federal Outlays per Recipient (1972 \$)	192	228	252	237	244

The fact that real expenditures per capita have remained relatively constant is a bit surprising, given that states have typically not increased maximum fees for services other than hospitalization. This downward bias in real medicaid payments seems to be offset by increases for hospitalization (which are on a cost basis) and overall increases in benefits in low-income states.

The price index used here is the CPI medical services index; additional weight for hospital costs was not considered necessary as it was in the case for medicare. This index is probably biased due to the large nursing home care component for medicaid and the fact that doctors' fees for medicaid are fixed, but it is the best index that is available.

The regression comparison of the CPI medical services index (CPIMS) with the CPI itself yielded:

$$\begin{aligned} \% \Delta \text{CPIMS} &= 2.77 + .79 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 1.66 \\ \text{interval} &= 1957 - 1975 \end{aligned}$$

Again, as in the case of medicare, the estimated inflation sensitivity was not significantly different from 1.0, which was, therefore, used as the estimate.

10. Veterans' Medical Care

Expenditures in this category are for a nationwide system of hospitals, outpatient clinics, and nursing homes run by the Veterans Administration. Current dollar and real expenditures on veterans' medical care are given in Table 10A.

TABLE 10A
VETERANS' MEDICAL CARE EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.87	2.23	2.51	2.79	3.41
Real Outlays (billion 1972 \$)	2.06	2.28	2.46	2.57	2.73
Federal Medical CPI Composite (CY1972=100)	91.0	97.8	102.1	108.4	124.7
Hospital Outlays per Patient-Day (1972 \$) ^a	48	54	57	60	61

a. From the Veterans Administration, Fiscal Year 1977 Budget Estimates, (Congressional Submission).

Current dollar outlays are deflated by a federal medical CPI composite described in the medicare section of this appendix. As the last line in Table 10A indicates, the services per patient-day provided in VA hospitals have increased over the past five years. Most of the increase in

the current dollar expenditures on the program has been due to the high rate of inflation for medical care.

For calculation of overall inflation sensitivity of federal expenditures, the following equation for the medical care component of the CPI was used:

$$\% \Delta \text{CPIFM} = 4.0 + \% \Delta \text{CPI}.$$

This equation, more fully discussed in the medicare section, assumes that medical costs will increase faster than the CPI by about 4 percentage points.

11. Unemployment Insurance

Expenditures on unemployment insurance are very sensitive to the unemployment rate; variation in unemployment insurance outlays are influenced primarily by numbers of unemployed workers and only secondarily by the inflation rate. Table 11A gives real and current dollar outlays on unemployment insurance for fiscal years 1971-75.

TABLE 11A
FEDERAL UNEMPLOYMENT INSURANCE EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	6.17	7.08	5.36	6.07	13.46
Real Outlays (billion 1972 \$)	6.49	7.19	5.23	5.44	10.86
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Average Regular Real Weekly Benefit (1972 \$) ^a	55	56	57	55	53
Average Overall Un- employment Rate (%)	5.7	5.9	5.2	5.0	7.3

a. From U.S. Department of Labor, Unemployment Insurance Service.

Since unemployment benefits are used for general consumer expenditures, the CPI was considered the correct price index. The figures for weekly benefits in Table 11A indicate that regular unemployment benefits have remained about constant in real terms over the past five years. If extended payments are counted, real benefits have increased a small amount.

Inflation affects unemployment benefits through wages, since an unemployed worker's entitlement is a function of his previous wage. Maximum benefits allowed under most state laws also increase with wages, so it is reasonable to assume that with the unemployment rate held constant, unemployment outlays increase at approximately the same rate as wages. A regression of average hourly earnings (AHE) on the CPI yielded the following results:

$$\begin{aligned} \% \Delta AHE &= 3.04 + .64 * (\% \Delta CPI) \\ \text{standard error of regression} &= .98 \\ \text{interval} &= 1948 - 1975. \end{aligned}$$

The regression coefficient of .64 and the high constant term of 3.04 indicate that wages do not adjust contemporaneously for changes in the CPI. When future and past values of changes in the CPI are added to the regression equation, however, a lower constant term and higher total sensitivity (sum of CPI coefficients) are obtained:

$$\begin{aligned} \% \Delta AHE_t &= 2.59 + .04 * (\% \Delta CPI_{t+2}) - \\ &.02 * (\% \Delta CPI_{t+1}) + .66 * (\% \Delta CPI_t) - \\ &.06 * (\% \Delta CPI_{t-1}) + .23 * (\% \Delta CPI_{t-2}). \end{aligned}$$

An F-test on the CPI coefficients indicates that their sum is not significantly different from 1.0. Therefore, the short-run inflation sensitivity of wages is estimated at 0.65, while the long-run sensitivity is estimated to be 1.0. This indicates that changes in wages lag behind changes in prices, but eventually are fully adjusted for inflation. Since unemployment benefits increase directly with wages, the inflation sensitivity for wages was used for unemployment benefit outlays.

12. Federal Civilian Pay

Federal civilian pay is determined by two different systems. The largest of these is the General Schedule (GS); federal white-collar workers (about 3/4 of the total) are paid according to the General Schedule. The one-quarter of federal civilian employees in blue-collar occupations have wages set by regional wage boards, and are usually called "wage board" employees.

Cost-of-living adjustments for GS workers are based on an annual nationwide survey of pay for professional, administrative, technical, and clerical workers (PATC Survey) made by the Labor Department.

After PATC figures have been established, the President has two options: (1) he can recommend to Congress that federal employees receive an increase, reflecting comparability based on the survey or some other criterion; or (2) he can suggest an alternative plan because of "national emergency or economic conditions affecting the general welfare." Either House can veto the alternate plan, in which case the comparability adjustment becomes effective. "Wage board" employees have their pay adjusted to private comparability from time to time throughout the year on the basis of local wage surveys.

In Table 12A below, current dollar expenditures on federal civilian pay are deflated by an index derived from the results of the PATC survey. Since total expenditures on federal civilian pay include payments to "wage board" employees, this procedure contains some bias; however, comparison of the PATC survey with average federal civilian salaries indicates that this bias is small. The real expenditure line in Table 12A is therefore a rough measure of the amount of labor employed by the federal government in a civilian capacity.

TABLE 12A
 FEDERAL CIVILIAN PAY EXPENDITURES
 FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	22.7	24.4	25.5	27.1	29.7
Real Outlays (billion 1972 \$)	24.8	25.1	24.8	24.8	25.1
PATC Survey Deflator (CY1972=100) ^a	91.6	97.3	102.9	109.4	118.2

a. The data used in constructing this deflator were obtained from Federal Pay Raise Projections, OMB Technical Paper BRD/FAB 75-3, July 30, 1975.

A regression comparing the percentage changes in the results of the PATC survey with percentage changes in the CPI yields the following results:

$$\begin{aligned} \% \Delta \text{PATC} &= 2.82 + .52 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= .90 \\ \text{interval} &= 1961 - 1974 \end{aligned}$$

This equation, which is very similar to the equation for average hourly earnings² indicates that pay increases were less than increases in the CPI during periods of high inflation, but pay increases were higher than price increases during period of relative price stability.

Since there is much more data available on average hourly earnings, and the relationship between the average hourly earnings series and the PATC survey results is very close, the inflation sensitivity of federal pay was taken to be the same as that for average hourly earnings: 0.65 in the short run and 1.0 in the long run.

13. Defense Personnel Expenditures

In the short run, at least, the impact of inflation on defense personnel costs is governed primarily by provisions linking military pay increases to those for federal civilian workers which are, in turn, linked to a survey of private sector wages. (A longer view might consider pay and worker quality adjustments toward equilibrium with the private labor market, but those considerations will not be treated here.) It is assumed that the results of the PATC Survey are applicable for military personnel also; thus the price index used here is the same as the one discussed in more detail in the civilian personnel section. Expenditures for military personnel for fiscal years 1971-1975 are given in Table 13A.

2. See Section 11 on unemployment insurance in this appendix.

TABLE 13A
 DEFENSE PERSONNEL EXPENDITURES
 FISCAL YEARS 1971 - 75
 (Military Active Duty and Reserve)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	22.6	23.0	23.2	23.7	25.0
Real Outlays (billion 1972 \$)	24.7	23.6	22.5	21.7	21.2
PATC Survey Index of Federal Pay Comparison (CY1972=100)	91.6	97.3	102.9	109.4	118.2
Military Personnel (Active Duty) (millions of man-years)	2.89	2.51	2.32	2.21	2.13

Military pay is tied to federal civilian pay, which is in turn tied to the PATC Survey. Therefore, the inflation sensitivity for military pay is taken to be the same as the inflation sensitivity of federal civilian pay:³ 0.65 in the short run and 1.0 in the long run.

14. OCS Lease Receipts

Receipts from federal government sale of rights to oil and natural gas production on the outer continental shelf (OCS) fall into two categories: bonuses paid for the acquisition of lease rights and royalties. These re-

3. And in turn, to be the same as the inflation sensitivity of average hourly earnings for production and nonsupervisory workers in the private nonfarm economy (see the previous two sections in this appendix).

ceipts are entered as negative outlays in the budget. As Table 14A below indicates, increases in bonuses and royalties have been considerable over recent years, due both to the increased price of oil and the development of technology to tap more OCS oil and gas reserves.

TABLE 14A
OCS LEASE RECEIPTS
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Receipts (billion \$)	1.05	0.28	3.96	6.75	2.43
Real Receipts (billion 1972 \$)	1.12	0.29	3.78	4.84	1.25
Wholesale Price of Fuel (CY1972=100)	93.7	97.7	104.8	139.4	194.8

Estimation of the inflation sensitivity of OCS receipts is largely a matter of guesswork. Although the fuel component of the wholesale price index was used for deflating past receipts, prices received for gas and oil in the future will depend on U.S. Government action on the controlled prices of these commodities and decisions by the OPEC cartel. If anything, inflation in fuel prices will cause increases in the CPI, not the other way around. The inflation sensitivity of OCS receipts was assumed to be 1.0, based on the idea that wellhead prices of oil and gas obtained from federal land will rise about as fast as the price level.

15. Net Interest Payments

The interest payment on the national debt is determined by the amount of government securities held by the public and the interest rate on those securities. The size of the national debt is determined by current and past fiscal

policy; interest rates are determined in the national market for capital and is influenced by the Federal Reserve System's monetary policy.

Net interest payments have gradually increased in the last five years both because the federal debt held by the public has increased and because average interest rates have gone up. Table 15A gives debt service expenditures for fiscal years 1971-75. These are net interest payments on debt held by the public (and the Federal Reserve System); payments of interest on federally held trust funds has been excluded.

TABLE 15A

NET INTEREST EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	14.8	15.5	17.4	21.5	23.3
Real Outlays (billion 1972 \$)	16.0	16.3	16.5	15.5	16.0
Implicit Deflator (CY1972=100) ^a	92.4	95.2	105.4	139.2	145.3
Current Dollar Debt Held by the Public (billion \$)	304.3	323.8	343.0	346.1	396.9
Real Debt Held by the Public (billion 1972 \$)	324.7	330.3	335.0	313.5	325.2

a. Real outlays are calculated by deflating the federal debt held by the public by the GNP deflator (CY1972=100) and then applying CY1972 interest rates to this figure. The implicit deflator is calculated by dividing real outlays into current dollar outlays.

Although current dollar outlays increased substantially in the 1971-75 period, real outlays remained approximately constant, because the real size of the federal debt (i.e., the debt deflated by the GNP deflator) remained constant.

The price of debt service (the rate of interest) is more sensitive to the rate of inflation than any of the other prices in this study. When the capital market is in long-run equilibrium and the inflation rate is constant, the rate of inflation is added to the real rate of return to obtain the nominal rate of interest. This happens because lenders must be compensated both for the use of their money and the fact loans will be paid in shrunken dollars. Thus, in the long run, if the rate of interest is 5 percent when the inflation rate is 3 percent, it should be 6 percent when the inflation rate is 4 percent. In this instance, the inflation sensitivity as usually calculated would be 20: a 20 percent increase in debt service payment is brought about by a one percentage point increase in the rate of inflation.

Two inflation sensitivity estimates were entered in Table 3 (in the main text) since either one of the estimates by itself would be misleading. The estimates of 2.8 in the short run and 14.0 in the long run were derived from regressions of the level of the Treasury bill rate on the rate of inflation and the long-run equilibrium condition that the rate of interest equals the real rate of return on capital plus the rate of inflation. The estimate of 1.0 when inflation premiums are excluded from interest payments is based on the assumption that the capital market should fully adjust the rate of interest for a rising price level.

Thus in the long run, an increase in the rate of inflation from 5 percent to 6 percent should increase the nominal interest rate from 7 percent to 8 percent. This induces a 14 percent increase in debt service payments, hence a long-run inflation sensitivity of 14. On the other hand, this increase in the interest rate is to compensate lenders for being paid principal in depreciated dollars. If this increased payment of real principal is removed from the expenditure column, then interest payments would be adjusted upward on a 1-to-1 basis with the price level, hence the estimate of 1.0.

16. Defense Purchases

The defense purchases category as discussed below includes all military and military assistance expenditures except payment of military and Defense Department personnel. Included are purchases of military hardware, maintenance of bases both in the U.S. and overseas, military research, and military assistance to foreign governments. Defense purchases for fiscal year 1971 to fiscal year 1975 are given in Table 16A.

TABLE 16A

DEFENSE PURCHASES (EXCLUDING PAY) FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	37.4	36.3	33.2	36.1	38.9
Real Outlays (billion 1972 \$)	39.7	37.0	32.4	32.1	29.4
BEA Index of Federal Purchase Prices (ex- cluding CCC and com- pensation)(CY1972=100)	94.2	98.2	102.6	112.5	132.2

These figures indicate that the real level of defense purchases has fallen throughout the 1971-1975 period. Since defense purchase programs that extend over a number of years are allocated budget authority for the full life of the program, with estimates of price increase built in, unexpectedly high rates of inflation generate the possibility of unintended cutbacks in real purchases. However, inflation-caused reductions in one purchase program can be remedied by higher levels of expenditure on future programs. It seems unlikely that most of the real reduction in defense purchases shown in Table 16A was unintended, but a precise determination is hard to make.

PFX, the BEA index of federal purchase prices excluding CCC (Commodity Credit Corporation) purchases and compensation is an index that only approximates defense purchase prices; it is used here because no price indices specifically constructed for defense expenditures exist. Regression analysis comparing PFX with the CPI for the period 1950 to 1975 yields the following results:

$$\begin{aligned} \% \Delta \text{PFX} &= -0.44 + 1.22 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 2.52 \\ \text{interval} &= 1950 - 1975. \end{aligned}$$

This equation indicates that federal purchase prices have risen faster than the CPI, and that their inflation sensitivity is greater than 1.0. Further analysis of PFX using future and past values of CPI change yielded:

$$\begin{aligned} \% \Delta \text{PFX}_t &= 1.30 + 0.48 * (\% \Delta \text{CPI}_{t+2}) - \\ &0.13 * (\% \Delta \text{CPI}_{t+1}) + 0.88 * (\% \Delta \text{CPI}_t) - \\ &0.87 * (\% \Delta \text{CPI}_{t-1}) + 0.01 * (\% \Delta \text{CPI}_{t-2}) \\ \text{standard error of regression} &= 1.43 \\ \text{interval} &= 1951 - 1973 \end{aligned}$$

These contradictory results seem to indicate that although federal purchase prices rose faster than the rate of inflation, there is no systematic relationship between changes in the CPI and changes in PFX. An average of these two results gives an uncertain estimate for the inflation sensitivity of 1.0. This estimate does not say that PFX and the CPI increase in a 1-to-1 relationship; both equations indicate that PFX rises faster than the CPI.

17. Veterans' Compensation and Pensions

This category includes disability payments to veterans who have been disabled as a result of military service, compensation for families of veterans, pensions for veterans who are aged or have become disabled after their service, and life insurance and cemetery benefits for veterans. None of these programs is indexed by law, but they keep pace with inflation since benefit increases are legislated each year. Table 17A gives historical outlays for this program.

TABLE 17A

VETERANS' COMPENSATION AND PENSIONS EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	5.80	6.14	6.54	6.63	7.58
Real Outlays (billion 1972 \$)	6.11	6.24	6.39	5.95	6.12
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Beneficiaries (millions of persons)	4.75	4.85	4.91	4.89	4.85
Average Yearly Real Benefit (1972 \$)	1280	1290	1300	1220	1260

Since these benefits are applied by recipients to consumer goods in general, the CPI was taken as the appropriate index for calculating the level of real benefits.

18. Veterans' Readjustment Benefits (GI Bill)

The GI Bill provides recent veterans with money for college courses, vocational school, and on-the-job training. These benefits, while paid in an entitlement program, are not indexed by law. Table 18A gives GI Bill expenditures and participation for fiscal years 1971 to 1975.

TABLE 18A

GI BILL EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.66	1.96	2.68	3.19	4.40
Real Outlays (billion 1972 \$)	1.75	1.99	2.62	2.86	3.55
CPI (CY1972=100)	95.0	98.4	102.4	111.5	123.9
Beneficiaries (millions of persons)	1.68	1.96	2.22	2.46	2.80
Average Yearly Real Benefit (1972 \$)	1040	1020	1180	1160	1270

The CPI was used to deflate outlays in this program because benefits include both student fee payments and living allowances. A more appropriate index would be a "student CPI," but no index of that sort is available. As can be seen, real expenditures per beneficiary have more than kept pace with inflation, although the changing composition of entitlements may account for part of this increase.

19. Revenue Sharing

Revenue sharing allocates federal funds among state and local governments with very little restriction on the use of these funds. Expenditures on the revenue sharing program, which began in 1972, are given in Table 19A.

TABLE 19A

REVENUE SHARING EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	0	0	6.64	6.11	6.14
Real Outlays (billion 1972 \$)	0	0	6.41	5.44	4.95
State and Local Govern- ment Purchases Defla- tor (CY1972=100)	91.6	97.1	103.6	112.3	124.0

As currently funded, increases in revenue sharing make up for only part of the erosion in real outlays caused by inflation. Part of this erosion may be due to the fact that both authorization and appropriation were passed in 1972. Revenue sharing outlays for calendar years 1973-1975 have not increased as fast as the CPI; the deflator for state and local government expenditures has increased faster than the CPI. The contemporaneous relationship between percentage change in the state and local government purchases deflator (PGSL) and the percentage changes in the CPI is given by the following regression:

$$\begin{aligned} \% \Delta \text{PGSL} &= 2.62 + .74 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 1.03 \\ \text{interval} &= 1947 - 1975 \end{aligned}$$

Since the inflation sensitivity coefficient is significantly less than 1.0, an equation using future and past values of CPI change was also estimated:

$$\begin{aligned} \% \Delta \text{PGSL}_t &= 1.84 + .21 * (\% \Delta \text{CPI}_{t+2}) - \\ &.07 * (\% \Delta \text{CPI}_{t+1}) + .78 * (\% \Delta \text{CPI}_t) + \end{aligned}$$

$$.27 * (\% \Delta \text{CPI}_{t-1}) + .20 * (\% \Delta \text{CPI}_{t-2})$$

standard error of regression = 0.98
interval = 1949 - 1973.

The sum of the CPI coefficients is not significantly different from 1.0.

These results give a coherent picture of the price response of state and local government purchases to inflation: PGSL lags behind the CPI because of a large wage component, but then catches up within two years. The positive (1.84) constant term indicates a rising trend of PGSL relative to the CPI.

The short-run inflation sensitivity of state and local government purchase prices was estimated at 0.9 from a regression restricting the long-run sensitivity to be 1.0.

20. Aid for Dependent Children (AFDC)

The AFDC program provides the federal share of welfare payments to families with dependent children on public assistance. This aid takes the form of payments to state agencies determined as a function of the state's AFDC benefits and per capita income in the state. Thus while federal AFDC payments are not explicitly a function of any price index, they will increase if the states increase AFDC payments to offset inflation. Table 20A gives federal AFDC expenditures, along with relevant price index and caseload data.

TABLE 20A
AFDC EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Federal Benefit Outlays (billion \$)	3.01	3.60	3.83	4.01	4.59
Real Federal Benefit Outlays (billion 1972 \$)	3.20	3.69	3.74	3.55	3.65
Poor People's Index ^a (CY1972=100)	94.1	97.7	102.3	113.0	125.6
Average Number of Recipients (millions of persons)	9.56	10.63	11.04	10.85	11.08
Real Monthly (federal and state) Benefit per Recipient (1972 \$)	52.50	53.00	52.20	50.70	51.20

a. The "Poor People's Index" is a cost of living index compiled by H.E.W. using the methodology described in R.G. Hollister and J.C. Palmer, "The Impact of Inflation on the Poor," in K. Boulding and M. Pfaff, eds., Redistribution of the Rich and Poor: The Grants Economic of Income Distribution (Wadsworth Publishing Co., 1972).

The real monthly benefit per recipient figures in the last line of Table 19A indicate that AFDC payments have approximately kept pace with inflation. Demographic changes and variations in non-assistance income both cause change in the per-recipient benefit figures; the small differences cannot reasonably be attributed to inflation.

For calculation of inflation sensitivity, the Poor People's Index was assumed to grow at the same rate as the CPI, since these price indices display only minor differences.

21. Employment and Training

The employment and training category includes training activities primarily under the Comprehensive Employment and Training Act (CETA), the Work Incentive Program (WIN), and operations of the federal-state employment service.

Since most of the money in this program is paid to state and local governments for their use in their employ-

ment and training programs, an appropriate price index is the implicit GNP deflator for state and local expenditures (PGSL). Table 21A below gives outlays for fiscal years 1971-1975 in current and constant 1972 dollars.

TABLE 21A
EMPLOYMENT AND TRAINING EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.95	2.89	3.28	2.91	4.06
Real Outlays (billion 1972 \$)	2.13	2.98	3.17	2.59	3.27
State and Local Govern- ment Purchases Deflator (CY1972=100)	91.6	97.1	103.6	112.3	124.0
Participation (thous- ands of person-years) ^a	555	691	739	666	751
Real Expenditure per Person Year (1972 \$)	3840	4310	4290	3890	4350

a. Growth and fluctuations in the number of person-years are due mostly to public service employment programs.

In the face of large price increases, real expenditures on employment and training have increased. Federal commitment to this program seems to have dominated the downward pressure exerted by inflation.

As explained more fully in the section in this appendix on revenue sharing, prices of state and local purchases (which are partially comprised of employment and training

expenditures) are estimated to have an inflation sensitivity of 0.9 in the short run and 1.0 in the long run.

22. Housing Payments

Expenditures on housing are allocated among a number of different programs: debt service payments on public housing projects, subsidized mortgage interest payments for low-income homeowners, rent supplements, and payments for operation of low-income housing projects.

In recent years, outlays on these housing programs have increased in real as well as current dollar terms, (except for fiscal year 1975) as seen in Table 22A below.

TABLE 22A

HOUSING PAYMENTS AND SUBSIDIES FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	0.74	1.12	1.60	1.78	2.07
Real Outlays (billion 1972 \$)	0.78	1.14	1.57	1.65	1.82
BEA Housing Deflator (CY1972=100)	94.3	98.3	102.1	107.6	113.9

Comparison of the housing component of the BEA personal consumption expenditures deflator (PCH) with the CPI yields the following regression results:

$$\begin{aligned} \% \Delta \text{PCH} &= 2.18 + .24 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 1.25 \\ \text{interval} &= 1947 - 1975. \end{aligned}$$

This indicates that the housing deflator has risen substantially less rapidly than the CPI. The low rate of increase for housing prices may be mainly due to a quality adjustment bias: the same structure provides less services over time as the neighborhood in which it is located deteriorates. It is difficult to correct for this bias, however, since other housing indices, such as the rent component of the CPI, are probably affected by the same problem. Some evidence of this bias is given by the behavior of the BEA deflator for new residential structures (PRES):

$$\begin{aligned} \% \Delta \text{PRES} &= .31 + 1.17 * (\% \Delta \text{CPI}) \\ \text{standard error of regression} &= 2.00 \\ \text{interval} &= 1947 - 1975. \end{aligned}$$

If it is assumed that land prices do not increase more slowly than the overall price level, the price of new housing has been rising substantially faster than the CPI. As a compromise between these two polar results, the results for the two equations were averaged, yielding the following equation which was used in the calculation of inflation sensitivity.

$$\begin{aligned} \% \Delta (\text{Housing Prices}) &= 1.0 + \\ &.7 * (\% \Delta \text{CPI}). \end{aligned}$$

23. Elementary and Secondary Education

Expenditures in this category consist primarily of federal aid to education agencies. ESEA Title I (aid to school districts with concentrations of poverty children), aid for Indian education, and aid to school districts impacted by other federal programs are included here. Vocational education grants and Operation Head Start are included also.

Total expenditures for elementary and secondary education in current and real terms are given in Table 23A.

TABLE 23A

ELEMENTARY AND SECONDARY EDUCATION EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	3.54	3.96	3.74	3.77	4.63
Real Outlays (billion 1972 \$)	3.92	4.10	3.63	3.47	4.04
Deflator for Education Compensation	90.3	96.7	103.0	108.8	114.7

Although real outlays declined in fiscal years 1973-74, they increased to fiscal year 1971-72 levels in fiscal year 1975; these changes are due in part to the effects of Presidential impoundments of fiscal year 1973 and fiscal year 1974 funds which were subsequently released and spent in late fiscal year 1974 and fiscal year 1975.

The price index used for education expenditures was a deflator (PE) for compensation of primary and secondary school teachers estimated by BEA. Regression analysis comparing percentage increases in this index to percentage changes in our standard inflation index, the CPI, yielded the following results:

$$\begin{aligned} \% \Delta PE &= 4.35 + .39 * (\% \Delta CPI) \\ \text{standard error of regression} &= 1.59 \\ \text{interval} &= 1960 - 1975. \end{aligned}$$

The coefficients indicate that over the 1960-1975 period of the regression, the cost of education rose steeply, but was not directly associated with price increases. The result coincides with the observation that these years were ones in which teachers' salaries were increasing

faster than salary levels in the rest of the economy. In the future, with enrollments increasing much more slowly, teachers' salaries will probably lose ground to inflation. On the other hand, contracting enrollments may force per pupil expenditures upward since school facilities will be less than fully utilized. This combination of factors leads to inflation sensitivity estimates which are below those for other labor-intensive expenditures: 0.4 in the short run and 0.8 in the long run.

24. Higher Education

Higher education programs include student assistance (basic grants, supplemental grants, direct loans and guaranteed loans), institutional assistance and special services aid to emerging and special institutions, programs to aid disadvantaged students, college housing loans, and other categorical programs (primarily fellowships). Total expenditures in this category in current dollar and real terms are given in Table 24A.

TABLE 24A

HIGHER EDUCATION EXPENDITURES FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	1.43	1.45	1.53	1.35	2.05
Real Outlays (billion 1972 \$)	1.57	1.50	1.48	1.27	1.71
Index of Student Charges (CY1972=100)	91	97	103	106	120

Real expenditures declined only slightly during fiscal years 1971-75. The dip in fiscal year 1974 outlays, caused

by the Administration's impoundment of funds, was restored in fiscal year 1975 when funds were released.

The index of student charges used to deflate current dollar outlays was derived from data on average student charges at both public and private institutions for six school years in the 1960-1975 period. A generalized least squares regression yielded:

$$\begin{aligned} \% \Delta PSC &= 2.86 + .54 * (\% \Delta CPI) \\ \text{standard error of regression} &= 1.51 \\ \text{interval} &= 1961 - 1974, 6 \text{ observations.} \end{aligned}$$

Student charges seem to behave very much like wages even though there are other components in education costs. This is a reasonable result, given the high labor intensity of education.

The inflation sensitivity estimates used here are those estimated using data on average hourly earnings: 0.65 in the short run and 1.0 in the long run. See section 11 in this appendix for a more detailed discussion of these estimates.

25. EPA Construction Grants

EPA construction grants provide state and local governments funds used primarily for sewage treatment plants and construction of sewer systems. Increased expenditures for these items help localities meet federal water pollution standards. Table 25A below gives real and current dollar outlays for these grants for fiscal years 1971-75.

TABLE 25A

EPA CONSTRUCTION GRANT EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	.48	.41	.68	1.55	1.94
Real Outlays (billion 1972 \$)	.55	.42	.66	1.38	1.43
EPA Sewer Construction Index ^a (CY1972=100)	86.5	96.9	103.5	112.5	136.0

a. This is a composite of the EPA indices for treatment plants and sewage facilities.

Comparison of the sewer and treatment composite (PEPA) with the CPI showed that while the CPI increased at a compound rate of 7.4 percent over the 1971-1975 period, the EPA composite increased at 11.1 percent per year. A translation of these figures into our standard linear equation relating price increases to increases in the CPI is:

$$\% \Delta \text{PEPA} = 2.0 + 1.2 * (\% \Delta \text{CPI}).$$

Thus, the estimated inflation sensitivity for EPA construction grants is 1.2.

26. Federal-aid Highways

Federal-aid highway outlays are used to pay the federal share of the construction of the interstate highway system, other state and local highways, and certain safety-related highway construction items. Real and current dollar expenditures on this account are shown in Table 26A.

TABLE 26A

FEDERAL-AID HIGHWAY EXPENDITURES FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	4.65	4.66	4.73	4.46	4.69
Real Outlays (billion 1972 \$)	4.94	4.80	4.61	3.48	3.15
Federal-Aid Highway Construction Index (CY1972=100)	94.0	97.0	102.6	128.3	148.9

The deflator used here is the federal-aid highway construction composite index, published by the Federal Highway Administration. It is composed mainly of labor, equip-

ment, and materials costs. When the index is broken down into these three categories, it is evident that materials have caused the bulk of the price increases, with equipment costs adding substantially to this rise; increases in labor costs are similar to those in other sectors of the economy. The enormous increase in the price of fuel is responsible for much of the increase in materials costs, because asphalt (a petroleum derivative), cement, and steel, the major construction materials, are heavily energy-intensive.

From the above table, it is evident that current dollar outlays have remained constant over the last few years, whereas real outlays have been steadily decreasing. It seems likely that (1) inflation has reduced the real size of the federal highway construction program, and (2) had the rate of inflation in highway construction costs been lower, the interstate system would be completed sooner.

Regression analysis comparing changes in the federal-aid highway construction cost index to the changes in the CPI gave very poor results and indicated that the price of highway construction is extremely variable and depends more on capacity considerations and materials costs than increases in the overall price level. Highway construction costs rise very rapidly during economic expansions, but level off or even fall during recessions. On the average, however, highway construction costs have risen about 1.2 times as fast as the CPI, and this figure is taken as an estimate of the inflation sensitivity.

27. Other Expenditures

This category is included for the sake of completeness rather than analysis. The outlays shown in Table 27A are total outlays minus the outlays for the 26 expenditure categories above. Subtraction of federal civilian pay involves some double-counting, since a few of the other 25 programs include administrative costs. This bias is thought to be minor.

TABLE 27A

OTHER EXPENDITURES
FISCAL YEARS 1971 - 75

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Current Dollar Outlays (billion \$)	25.8	32.1	30.3	30.9	40.2
Real Outlays (billion 1972 \$)	27.4	32.7	29.5	27.5	30.4
BEA Index of Federal Purchase Prices (ex pay and CCC) (CY1972=100)	94.2	98.2	102.6	112.5	132.2

The price index used for these expenditures is BEA's unpublished index of federal purchase prices (ex pay and CCC) discussed in the defense purchases section of this appendix. The inflation sensitivity of federal purchases estimated there is 1.0.

APPENDIX B

THE TIMING OF INCREASES IN INDEXED EXPENDITURES

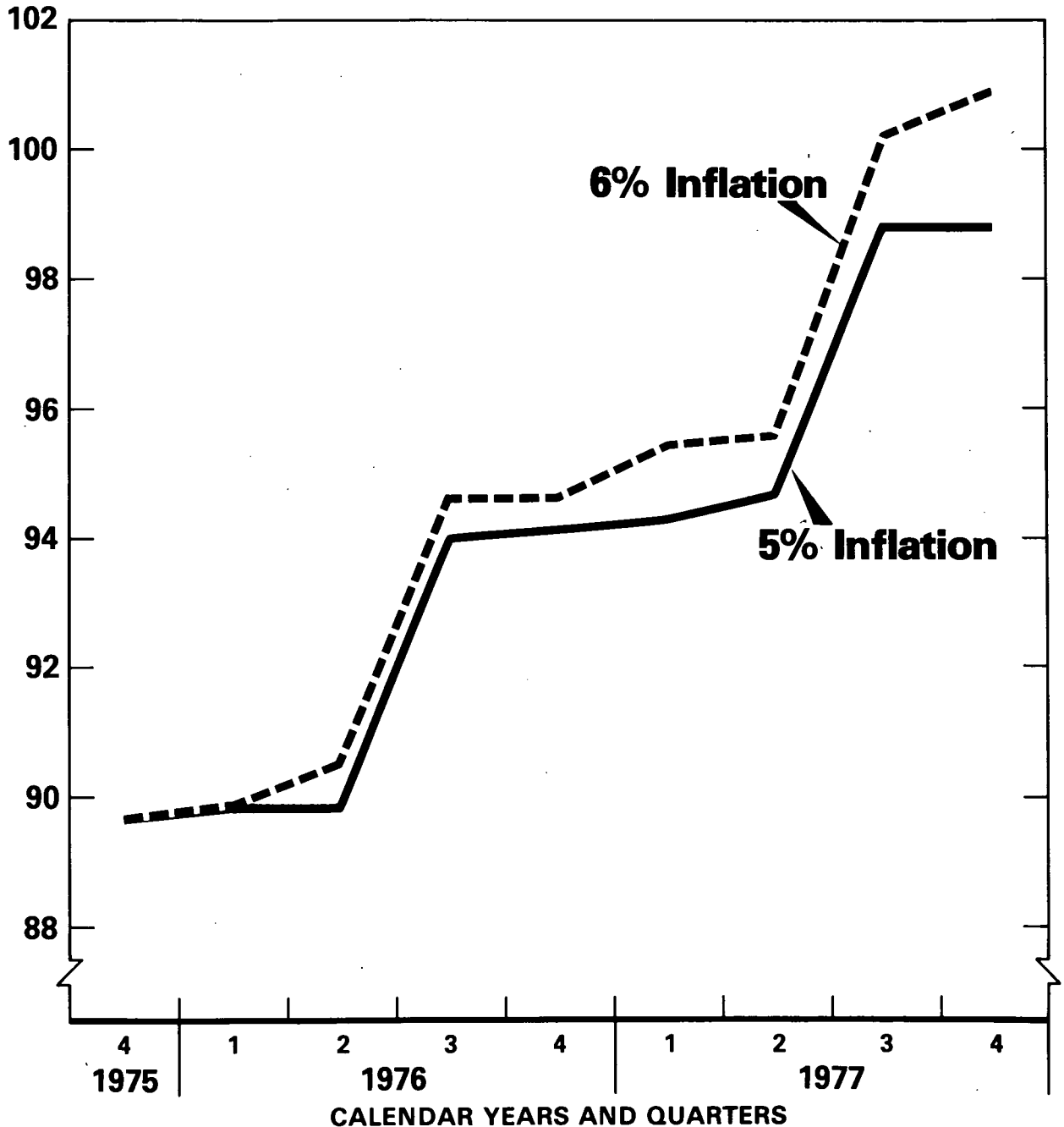
A substantial section of the federal budget is automatically adjusted for inflation; outlays increase to compensate for increases in the price level. However, the way these adjustments are made vary from program to program and the structure of these mechanisms affect both the level of outlays and the timing of the increases. Appendix Chart 2 illustrates how indexed expenditures increase under different assumptions of inflation; one path projects expenditures with a 5 percent increase in prices, while the other assumes a 6 percent rise. Both paths assume a steady 5 percent inflation rate in 1975. Inflation is measured by changes in the CPI or in a specialized subsection of the CPI, like CPI-Food-Away-From-Home.

The timing, or the lag structure involved, is irregular; the rate of inflation itself determines the timing of payments. Most of the programs that are indexed are adjusted regularly. Social security, supplemental security income and railroad retirement are all adjusted annually and the increases start in the third quarter of each year. Since these are yearly adjustments, and because these three programs account for over 75 percent of all indexed expenditures, the adjustments are bound to cause a large increase in outlays in the third quarter. Most of the other programs, such as food stamps and child nutrition funds, are corrected for inflation semi-annually. However, the programs are adjusted for the half year that ended six months earlier. Thus, at high rates of inflation, a considerable amount of real income is lost during the lags between adjustments. Congress, attempting to alleviate this problem, set up a third type of adjustment mechanism for federal civilian and military retirement pensions. Whenever the CPI increases 3 percent above the level of the last adjustment and remains above for 3 months, the benefits are raised by the percentage increase in the CPI at the high month of the three month period, plus one percent extra.

Appendix Chart 2

Time Structure of Expenditures on Indexed Programs at 5% and 6% Inflation, Recipients at Fiscal Year 1975 Levels

EXPENDITURES (\$BILLIONS)



In Appendix Chart 2, at the 5 percent rate of inflation, federal retirement is adjusted twice during the two-year period, while at the 6 percent rate, it is adjusted three times. The overindexation of federal retirement makes the 1977 fourth quarter expenditures more than 2 percent higher on the 6 percent path than on the 5 percent path, while continuous indexation would have yielded a difference of less than 2 percent. However, the most obvious timing feature is clearly the third-quarter jump in expenditures due to the annual social security adjustment.

