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DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
1. memo	the Secretary to the members of the Executive Board re attached appendices (1 pp.) <i>R 10/20/2010 F95-043/1#49</i>	7/22/85	P1
2. appendices	report re recent economic developments supplementary material - appendices (126 pp.) <i>R 10/20/2010 F95-043/1#50</i>	7/19/85	P1

RESTRICTION CODES

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July 22, 1985

To: Members of the Executive Board
From: The Secretary
Subject: United States - Recent Economic Developments

The attached appendices to the paper on recent economic developments in the United States have been prepared as further background material to the staff report for the 1985 Article IV consultation with the United States (SM/85/199, 7/8/85).

Mr. Hernandez-Cata (ext. 8486) or Mr. P. B. Clark (ext. 8493) are available to answer technical or factual questions relating to this paper prior to the Board discussion.

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NLRR F95-043/1 #49

BY RW **NARA DATE** 10/20/10

INTERNATIONAL MONETARY FUND

UNITED STATES OF AMERICA

Recent Economic Developments
Supplementary Material - Appendices

Prepared by a staff team consisting of E. Hernandez-Cata,
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Approved by the Western Hemisphere Department

July 19, 1985

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NLRR P95-043/1 #50

BY RW NARA DATE 10/20/10

The Recent Behavior of Business Fixed Investment and the
Effects of Fiscal Incentives

A distinguishing feature of the 1983-84 economic recovery in the United States has been the exceptional strength in gross business fixed investment in the face of historically high real interest rates. Several factors have been advanced to explain this phenomenon, including improved fiscal incentives (introduced by the U.S. Administration in 1981 and modified in 1982), the effects of a sharp decline in the rate of inflation, rapid technological change that dramatically reduced the cost of processing information, and the general vigor of the economic recovery. This appendix examines the recent upswing in investment with the aim of evaluating the relative importance of the various factors that have contributed to its strength. In section 1, recent changes in the composition of business fixed investment are reviewed in the context of longer term trends. Section 2 provides some empirical evidence on the relationship between the major components of business fixed investment and their determinants, especially the cost of capital. These relationships are then used in section 3 to examine the extent to which the recent upturn in investment is attributable to changes in financial conditions, to changes in fiscal incentives, and to the general recovery of the economy.

1. The nature of the 1983-84 recovery in nonresidential business
fixed investment

Following five quarters of substantial declines, nonresidential gross fixed investment began to rise in the first quarter of 1983 and picked up momentum in the second half of the year. During the first nine quarters of the recovery, business fixed investment rose by almost 32 percent, much more than during any recovery period in the postwar era (see following tabulation and upper panel of Chart 1). As is typically the case during the early stages of an investment cycle, the rise in business fixed investment initially was stronger for producers' durable equipment; structures continued to decline for the first two quarters of the recent recovery. By the final quarter of 1983, however, both major components of business fixed investment were increasing rapidly.

(Percentage increase over nine quarters
from trough of recession in GNP)

	1982:IV 1985:I	Typical 1/ Recovery	1975:I 1977:II	1963:IV 1966:I 2/
Nonresidential business				
fixed investment	31.9	16.5	15.0	36.4
Producers' durables	38.8	21.5	19.9	38.4
Structures	17.2	9.0	4.1	33.7

At a more detailed level of disaggregation, the components of business fixed investment have exhibited considerable variation in growth profiles during the 1983-84 recovery (Table 1). Spending on transportation goods, high technology equipment, and commercial structures rose by 70 percent, 35 percent, and 50 percent, respectively, from the fourth quarter of 1982 to the first quarter of 1985. In contrast, by early 1985, spending on certain components of nonresidential structures--particularly industrial and farm buildings--was still well below the levels recorded more than two years earlier.

These variations in growth patterns among the components of business fixed investment during the recent recovery are to a certain extent a continuation of longer-term trends. As illustrated in the lower panel of Chart 1, the share of producers' durables in total business fixed investment increased from 55 percent in 1958 to a peak of nearly 72 percent two decades later; this share declined somewhat during the period of output stagnation in 1980-82 before climbing steeply during the 1983-84 recovery.

The increased share of producers' durables in business fixed investment has been accounted for by high technology goods (upper panel Chart 2); the share of this component in business fixed investment rose from 7 1/2 percent in 1958 (the earliest date for which such detailed data are available on a quarterly basis) to 33 1/2 percent in 1984.

1/ During the postwar period there have been eight recoveries which are dated by the National Bureau of Economic Research from the following troughs; 1949:4, 1954:2, 1958:2, 1961:1, 1970:4, 1975:1, 1980:3, and 1982:4. Two of these recoveries--those associated with recession troughs in 1949:4 and 1980:3--have been excluded in calculating the typical recovery. The strength of the recovery from the 1949 trough was distorted by the outbreak of the Korean war and the 1980-81 recovery lasted only 12 months--a period that is half the length of any other recovery in the last 50 years. By and large the exclusion of these two recoveries has little effect owing to the tendency of the weak 1980-81 recovery to offset the exceptional strength experienced during the upswing of 1950-51.

2/ This interval covers the strongest nine-quarter rise in nonresidential fixed investment during the postwar period.

This development is in large part a consequence of the dramatic advances in the quality, and sharp falls in the price, of computing equipment in recent years. In contrast, the share of heavy industry equipment, which had remained steady at around 18 percent from 1958 to the mid-1970s, has dropped markedly during the past decade reflecting the decline in the relative importance of this sector in the U.S. economy. The share of transportation equipment (which is particularly sensitive to cyclical fluctuations) was on a moderately rising trend during the two decades prior to 1979, and following a sharp drop from 1979 to 1982, it has climbed steeply during the recent recovery (lower panel of Chart 2). The proportion of investment expenditures related to construction and agriculture was fairly constant at around 6 percent between 1958 and 1980; since then it has dropped to under 3 percent of business fixed investment. Both of these sectors were particularly affected by the stagnation of output during the period 1980-82.

Since 1958, all major components of structures have tended to decline in relation to nonresidential investment. The fall in the shares of public utilities and industrial and institutional buildings was especially marked (Chart 3). After declining during the 1960s, the share of petroleum drilling and mining increased substantially in 1975 and in 1980-81, following substantial rises in world oil prices; that share dropped steeply during the recent period of weakness in oil prices.

In the past several years the strongest increases in gross business fixed investment have been in assets with relatively short service lives. For example, more than one third of the increase in business fixed investment during the present recovery has been accounted for by high technology goods (which consist mainly of computing equipment).^{1/} This component of business fixed investment has an average service life of roughly ten years. In comparison, the components of nonresidential

^{1/} It should be noted that the contribution of high technology equipment may be understated (as would be the growth of business fixed investment and real GNP), owing to the methodology used by the U.S. Department of Commerce to estimate real business fixed investment in computer equipment. Such investment is estimated using expenditure data (which are defined in nominal terms) deflated by a price index which has been fixed at its 1972 base value of unity. In view of the advances in electronic computing equipment during the past decade, this procedure probably overstates by a considerable margin the level of the price deflator and consequently understates the volume of expenditure on this component of investment. By way of illustration, if the deflator for the computer component of business fixed investment had declined by 10 percent annually during the period 1972-84, the average annual growth rate of GNP in 1972 dollars would have been roughly 1/2 percent higher during this period while the GNP deflator would have been 1/2 percent lower. The U.S. Department of Commerce is expected to adjust its methodology for estimating this component of business fixed investment in December 1985 when comprehensive benchmark revisions to the national accounts will be made.

construction (such as industrial and farm buildings, and public utilities) that have tended to decline or to increase slowly during 1983-84 have average service lives in the range of 26-51 years (Table 2).^{1/}

As the mix of gross investment has shifted toward short-lived assets over the past 25 years, the average service life of gross additions to the capital stock has declined markedly. As shown in the upper panel of Chart 4, the average service life of gross additions to the capital stock has declined almost continuously from about 22 years in the late 1950s to 17 1/4 years in 1984, with particularly sharp drops during 1971-78 and 1983-84. The volume of investment necessary to maintain the existing capital stock has increased along with the decline in the average service life of the capital stock. As a result, the ratio of depreciation to gross nonresidential fixed investment, which had dropped from 0.79 in 1958 to a trough of 0.61 in 1967, has exhibited a distinct upward trend since the late 1960s (lower panel of Chart 4).

The rising trend in the proportion of gross investment devoted to replacement has been reflected in a growing gap between gross and net investment.^{2/} The ratio of gross business fixed investment to GNP (both measured in constant dollars) has been rising steadily over the past three decades, with only a minor break in the trend during the deep cyclical downswing in investment in 1975 (upper panel of Chart 5). In 1984, the ratio of gross investment to GNP was well above any level registered in the postwar period. At the same time, the ratio of net investment to net national product turned down in the late 1960s, and in spite of a rebound in 1984, it was still well below its historical peak in 1966. Despite the strong upturn in gross fixed investment during 1983 and 1984, the net addition to the productive capital stock in 1983 was near a postwar low and in 1984 it was barely above the historical average (see lower panel of Chart 5).

As indicated above, the concentration of investment in relatively short-lived assets means that an increasing proportion of gross investment must now be devoted to replacement, and that less investment is available to raise the productive capital stock and the potential output

^{1/} Details regarding estimates of average service lives are provided in Fixed Reproducible Tangible Wealth in the United States, 1925-79 (Washington, D.C., U.S. Government Printing Office, 1982) and Musgrave (1976).

^{2/} Net fixed investment is defined as gross fixed investment less capital consumption allowances, which in the national accounts are usually calculated using a straight-line depreciation assumption. (Capital consumption allowances are also published using a double-declining balance formula and with variations on a scaling factor applied to service lives derived from tax data; estimates of capital consumption allowances do not appear to be particularly sensitive to the choice of methodology.) On a quarterly basis, capital consumption allowances in real terms are published only at the level of total fixed investment. Annual data for capital consumption allowances for nonresidential investment in 1984 have not yet been published; the data used are staff estimates.

of the economy. However, such investment has served as the vehicle through which new technologies have been introduced into the economy. Indeed, it appears that during the past several years the most productive technologies have been incorporated in certain components of producers' durables (such as electronic computing equipment) which happen to have a relatively high depreciation rate.^{1/} Accordingly, investment in this type of asset may have boosted productivity growth which may have offset, at least in part, the effect of the lower growth of the net capital stock on the economy's growth potential.

2. The determinants of business fixed investment, 1981-84

As was noted above, a variety of reasons have been advanced to explain the exceptional strength of business fixed investment in the recent recovery. In this section and in section 3, some empirical evidence is presented that attempts to isolate the contribution of four potentially important factors: the robust recovery in aggregate demand; the marked decline in interest rates during 1982-83; the new tax incentives embodied in legislation in 1981 and 1982;^{2/} and a fall in the relative price of capital goods. Special attention is devoted to the changes in tax incentives owing to their importance as a policy instrument. The theoretical basis underlying the investment equations is presented in this section, together with estimation results and details regarding the construction of the cost of capital variables--the variables through which the effects of fiscal incentives are transmitted to investment. Section 3 reports the results of simulations which assess the relative importance of the factors underlying the 1983-84 investment upswing.

a. Investment equations

The equations used in this study are based on the neoclassical theory of capital accumulation, according to which the optimal combination of factor inputs used by firms depends on the relative prices of those inputs. If output is produced under competitive conditions and if the production function is of the Cobb-Douglas type, the desired capital stock at each point in time will be given by the expression:

$$K^d = \alpha \frac{Y}{C} \quad (1)$$

^{1/} It is noteworthy that this process has not been influenced in a significant way by changes in the tax system. As noted below, recent modifications to the tax structures for corporations have favored longer-lived assets such as structures.

^{2/} The key elements of this legislation are summarized in Table 3.

where

K^d = desired net capital stock

Y = output

C = real user cost of capital

α = a constant

The flow of net investment is the change in the actual capital stock as it adjusts toward a new desired level. Because the actual capital stock can be changed only gradually over time, net investment (i.e., the change in the net capital stock) will depend on current and lagged values of the desired capital stock:

$$I_t^N = \beta(L) \Delta K_t^d \quad (2)$$

where

I_t^N = net investment and

$$\beta(L) = \beta_0 + \beta_1 L + \dots + \beta_N L^N$$

is a polynomial in the lag operator L ($L^j x_t = x_{t-j}$). Combining (1) and (2) and assuming that replacement investment is proportional to the lagged capital stock, we can write gross investment, I_t^g , as:

$$I_t^g = \gamma(L) \Delta(Y/C)_t + \delta K_{t-1} \quad (3)$$

where

$$\gamma(L) = \alpha \beta(L) \text{ and}$$

δ is the rate of economic depreciation.

Equations such as (3) are commonly used in empirical studies of investment behavior (see, for example, Clark, 1979). The variation of (3) that is used in this appendix is based on the work of Bischoff (1971). Bischoff's version of the neoclassical model is based on the empirical observation that most changes in the capital output ratio are embodied in new equipment and structures; existing capital goods are less often modified in response to fluctuations in the cost of capital. On this basis Bischoff allows for different lags on the output and relative price terms so that the level of investment is affected by the level of relative prices and the change in output.

$$I_t^g = \gamma_1(L)(Y_t/C_{t-1}) + \gamma_2(L)(Y/C)_{t-1} + \delta K_{t-1} \quad (4)$$

b. Fiscal incentives and the cost of capital

The cost of capital (C) plays a central role in the theory of investment outlined in the previous sub-section. This concept stems from the neoclassical theory of optimal capital accumulation (Hall and Jorgenson, 1967) in which the price of a capital asset is equated to the present value of after-tax services expected to accrue from that good. According to this approach, the cost of capital in real terms may be expressed as follows:^{1/}

$$C = q[(1 - wu) i + \delta - \dot{p}^e(1 - \tau)] (1 - k - uz)/(1 - u) \quad (5)$$

where,

u is the marginal corporate tax rate

i is the average cost of funds ^{2/}

w is a weight that accounts for tax deductible sources of finance
(in the U.S. case, interest payments)

δ is the rate of economic depreciation

$\dot{p}^e$ is the expected rate of inflation ^{3/}

τ is the tax rate on capital gains ^{4/}

k is the investment tax credit per dollar of new investment

z is the present value of a dollar of depreciation deductions

q is the price of capital assets relative to the GDP deflator

^{1/} For a derivation and detailed explanation of this formula, see Ott, Ott, and Yoo, 1975. It should be noted that if there are no taxes ($u = \tau = k = 0$), the formula reduces to $C = q(i + \delta - \dot{p}^e)$.

^{2/} A weighted average of the ten-year BAA corporate bond rate, the Standard and Poor's dividend/price ratio for common stocks and the three-month Treasury bill rate. The weights are the respective proportions of total credit market debt owed by private business, an estimate of total business equity, and corporate cash flow, in the sum of these items.

^{3/} From 1979 onward, the ten-year ahead survey of expected inflation conducted by A.C. Becker, Paribas, Inc. Prior to 1979, a four-quarter moving average of the University of Michigan's survey of one-year ahead consumer price expectations. A regression of the ten-year ahead survey on the moving average of the Michigan survey over the period 1979-84 had yielded a regression coefficient of unity.

^{4/} The maximum rate on capital gains.

Actual values of the nominal cost of capital (i.e., excluding expected inflation and relative price changes) for equipment dropped sharply during 1982 before flattening out and remaining roughly unchanged for the next two and a half years (see Chart 6). The profile of the cost of capital for structures is similar, although the fall, after mid-1981, has been more protracted.

In constructing the cost of capital in real terms the variable is approximated by the (legislated) maximum tax rate on capital gains. It may be noted, however, that this may not be representative of the average effective capital gains tax because capital gains are often deferred from tax or excluded at the end of the lifetime of the asset. To illustrate the implications of alternative assumptions about the tax rate on capital gains, two measures of the cost of capital variables are provided in the following tabulation. The first measure sets the capital gains tax to zero, while the second sets the tax at its maximum rate (the value used in the remainder of this appendix). As can be seen in the tabulation, the main effect of reducing the capital gains tax to zero is to lower the level of the cost of capital. However, in some years--especially when the expected rate of inflation is changing rapidly--the time profile of the cost of capital is also modified somewhat.

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
<u>Equipment</u>					
Real cost of capital					
With capital gains tax set to zero	12.1	14.1	14.7	12.9	13.4
With capital gains tax set to maximum rate	14.5	16.1	16.2	14.2	14.6
<u>Structures</u>					
Real cost of capital					
With capital gains tax set to zero	4.5	6.8	7.4	5.3	6.4
With capital gains tax set to maximum rate	7.7	9.5	9.3	6.8	7.8
<u>Total business fixed investment</u>					
Real cost of capital					
With capital gains tax set to zero	9.9	11.9	12.4	10.7	11.5
With capital gains tax set to maximum rate	12.5	14.1	14.0	12.1	12.7

c. Estimation

Equations corresponding to (4) above were estimated by autoregressive least squares for the period 1962:I to 1981:III, with the end of the estimation period corresponding to the enactment of the ERTA legislation. The regression results are reported below.^{1/}

Producers' durables

$$\frac{IE}{Y^*} = -5.99(1/Y^*) + 0.25 \sum_{s=0}^{19} \lambda_s \frac{Y_{-s}}{Y_{-s}^* CE_{-s-1}}$$

(2.0) (5.9)

$$-0.25 \sum_{s=0}^{19} \mu_s \frac{Y_{-s-1}}{Y_{-s}^* CE_{-s-1}} + 0.11 KE_{-1}/Y_{-1}^* \quad (9.8)$$

(5.8)

$$\rho = 0.67 \quad \overline{R}^2 = 0.973 \quad DW = 2.02 \quad F = 1.93 \quad (1.90)$$

(5.5)

Nonresidential structures

$$\frac{IS}{Y^*} = 11.19(1/Y^*) + 0.07 \sum_{s=0}^{19} v_s \frac{(Y_{-s} - Y_{-s-1})}{Y_{-s}^* CS_{-s-1}}$$

(1.1) (4.0)

$$+ 0.03 KS_{-1}/Y_{-1}^* \quad (2.5)$$

$$\rho = 0.95 \quad \overline{R}^2 = 0.978 \quad DW = 1.65 \quad F = 0.81 \quad (1.89)$$

(24.1)

where

IE is investment in producer's durables

IS is investment in nonresidential structures

Y* is potential GNP

^{1/} The precise specification of these equations follows Clark's (1979) interpretation of the Bischoff formulation. The normalization of all variables with respect to potential GNP reduces heteroskedasticity in the equation error term. In the equation for nonresidential structures, the lag structure is simplified somewhat, by combining the terms containing current and lagged output (for example, the second and third terms of the right-hand side of the equation for producers' durables). This restriction is not statistically significant.

λ_s , μ_s , ν_s , are coefficients estimated using a sixth degree Almon polynomial with a zero end-point constraint

CE is the real cost of capital for producers' durables

CS is the real cost of capital for nonresidential structures

KE is the gross stock of producers' durable equipment 1/

KS is the gross stock of nonresidential structures

F is the Chow test statistic for parameter stability over the remaining 14 periods of the sample not used during estimation. The critical 5 percent F statistic is in parentheses.2/

3. Simulations

Four simulations were carried out to analyze the differential effects of taxes, output, interest rates, and relative prices on investment demand over the period 1982-84.3/

a. Simulation 1: the effects of ERTA/TEFRA

In the 1981 Economic Recovery Tax Act (ERTA), two measures were introduced to stimulate fixed investment: the investment tax credit (ITC) was liberalized to cover a broader range of short-lived equipment, and the Accelerated Cost Recovery System (ACRS) for asset depreciation was introduced. Both these measures reduced the after-tax cost of investing in new equipment and nonresidential structures. The extension of the investment tax credit to a broader range of equipment raised the value of the variable k in equation (5) while ACRS increased the present value of depreciation allowances--the variable z in equation (5). Under the 1982 Tax Equity and Fiscal Responsibility Act (TEFRA), tax incentives

1/ The use of the gross capital stock implies that economic depreciation follows a straight line rule. Using the net capital stock instead would imply exponential depreciation. Quarterly observations on the gross capital stocks were constructed by interpolating annual end-of-year stocks according to the patterns of gross investment throughout the year.

2/ The equation for equipment marginally fails this test, although it passes at the 1 percent significance level. For structures, the test is passed at the 5 percent level. Both equations therefore exhibit a reasonable degree of parameter stability over the full sample period. A similar result was found by Sahling and Akhtar (1984) who tested for a structural break following the ERTA legislation.

3/ Before carrying out these simulations the equations reported in the previous section were re-estimated up to 1985:I. The only notable change to the estimation results was a marked rise in the level of autocorrelation in the equation for producers' durables.

to investment were reduced, offsetting in part the effects of ERTA.^{1/} A proposed extension of ACRS to allow firms to use more favorable depreciation methods (175 percent declining balance compared with 150 percent declining balance under ERTA) was not enacted. In addition, some of the benefits of the ITC were cut back by reducing the depreciable base of assets by 50 percent of the ITC.

Effect of Tax Changes on the Real Cost of Capital

(1980 = 100)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
<u>Equipment</u>					
Present value of a dollar of depreciation allowances ^{2/}	0.829	0.833	0.886	0.917	0.909
Excluding effects of ERTA/TEFRA	0.829	0.815	0.815	0.849	0.840
Real cost of capital	100	107.2	103.6	87.7	87.7
Excluding effects of ERTA/TEFRA	100	108.7	110.1	89.9	89.9
Percentage reduction attributed to legislation	--	1.4	5.9	2.4	2.4
<u>Structures</u>					
Present value of depreciation allowances ^{2/}	0.603	0.631	0.793	0.853	0.810
Excluding effects of ERTA/TEFRA	0.603	0.578	0.579	0.638	0.622
Real cost of capital	100	126.8	122.7	86.6	95.9
Excluding effects of ERTA/TEFRA	100	132.0	142.3	101.0	109.3
Percentage reduction attributed to legislation	--	3.9	13.8	14.3	12.3

^{1/} The measures affecting business fixed investment that were contained in the Deficit Reduction Act (DEFRA) of 1984 were relatively minor (see Table 3).

^{2/} Before the fourth quarter of 1981, a weighted average of straight-line and sum-of-years' digits methods, in which the weight reflects the proportion of business fixed investment using accelerated depreciation methods. After 1981, a weighted average of straight line and declining balance methods (150 percent for equipment, 175 percent for structures) is used. The formula for z assumes a constant discount rate, with the constant rate at any particular time being equal to the actual value of the average cost of funds. The data used in constructing the present values of depreciation allowances were supplied by Wharton Econometric Forecasting Associates.

Chart 7 and the above tabulation show the estimated effects of ERTA/TEFRA on the real after-tax cost of capital for both equipment and structures.^{1/} In the case of equipment, the effect of ERTA was to increase the present value of a dollar of depreciation allowances by 8.7 percent (from 0.815 to 0.886) at the level of interest rates prevailing in 1982. These changes in depreciation allowances, when combined with the more generous Investment Tax Credit, lowered the real cost of capital for equipment by almost 6 percent in 1982. As regards structures, the increase in the present value of depreciation allowances due to ERTA was 37 percent in 1982. As a result, the cost of capital for structures in 1982 was almost 14 percent lower than it would have been in the absence of ERTA.

The benefit of investment tax credits on producers' equipment was reduced by TEFRA in 1983, offsetting in part the effects of ERTA on the cost of capital (see preceding tabulation). In 1983, the combined effects of ERTA and TEFRA lowered the cost of capital for equipment by about 2 1/2 percent (compared with 6 percent with ERTA alone) relative to what it would have been in the absence of both pieces of legislation. In the case of structures, both TEFRA and the 1984 Deficit Reduction Act had little impact on the cost of capital. In 1984, the combined effect of all three pieces of legislation was to lower the cost of capital by 12 1/4 percent compared with what it would have been otherwise; this compares with a reduction of 13 3/4 percent in 1982, which reflected only the impact of ERTA.

Simulation 1 was performed by assuming no change in the tax treatment of investment over the period 1981-84, and comparing the path of investment simulated under that assumption with the path of investment predicted by the equation. It should be noted that actual values of output and interest rates were used in the simulation; no attempt was made to determine the effects of ERTA/TEFRA on these variables or any repercussions of these effects on investment. The results of the simulation are presented in Table 4. It appears that the stimulative effect of the legislative changes on investment in producers' durables has been quite small--roughly 1/2 percent of the level of producers' durables by 1984. In the case of nonresidential structures the results suggest that the net effect of the tax changes has been considerably larger--approximately \$1 1/2 billion or 2 1/2 percent of the level of expenditures on structures 1984.^{2/}

^{1/} In the simulations, it was assumed that the retroactivity of ERTA to the beginning of 1981 was not anticipated by investors; the simulation was carried out as though there had been no change in legislation affecting the first three quarters of 1981.

^{2/} These results will understate the total impact of ERTA and TEFRA to the extent that the long adjustment in the estimated equations has not been completed by the end of the simulation. After three years, roughly three fourths of the lagged effects of changes in the explanatory variables in the estimated equations are completed.

b. Other simulations

Three other simulations were carried out to isolate the sources of strength in business fixed investment during the 1983-84 recovery. In the first simulation, the average cost of funds—was maintained at its exceptionally high level of the first quarter of 1982. In the second simulation, output in the business nonresidential sector was adjusted so as to increase at the same rate as during the typical postwar upswing. In the final simulation, the deflator for investment goods (which fell relative to the GNP deflator during the recovery) was constrained to increase at the same rate as the GNP deflator during 1983-1984 upturn.

c. Summary of simulation results

The most important factor accounting for the exceptional rise in business fixed investment (at least after the first year of the recovery) appears to have been the robust expansion of total output. By the first quarter of 1985, this factor accounts for more than one third of the above-average portion of the rise in business fixed investment. Among the other factors, the large drop in the cost of funds during 1982-83 seems to be the most important; roughly one fourth of the difference between the growth of investment in the recent recovery and in the typical postwar recovery is attributable to this factor. The effect on investment stemming from the decline in the relative price of capital goods is estimated to have accounted for about one fifth of the above-average increase in investment during the recent recovery. Finally, recent changes to tax legislation that affect businesses appear to make only a relatively small contribution to the exceptional rise in business fixed investment. The effects of the tax legislation are substantial as regards nonresidential structures but apparently they are very small in the the case of producers' durables. This difference stems from the fact that the tax measures had a much larger impact on the real cost of capital for structures than for equipment.^{1/}

As can be seen from Table 4, the simulation results account almost fully for the exceptional rise in total business fixed investment during the nine quarters ended the first quarter of 1985. However, this result reflects in part offsetting errors in the equations for producers' durables and for nonresidential structures. The inability of the equations to explain fully the recent change in the composition of investment expenditures may reflect a shift in demand away from more traditional investment goods (for example, industrial structures) in favor of high technology items (such as electronic computing equipment) where dramatic technological breakthroughs have occurred in recent years. The difficulty may also be related to the measurement problems associated with the price deflator for computer equipment that were mentioned in section 1.

^{1/} This result is broadly in line with the conclusions of a study by the Applied Econometrics Staff, Office of Economic Policy, U.S. Treasury Department.

Table 1 . United States: Components of Real Nonresidential Fixed Investment

(Percentage change from the fourth quarter of 1982)

	1983				1984				1985
	I	II	III	IV	I	II	III	IV	I
Business fixed investment <u>1/</u>	0.1	2.4	6.9	14.2	19.7	25.6	29.7	32.4	31.9
Producers' durable equipment	2.6	6.9	13.3	21.3	26.9	33.2	38.9	40.8	38.8
High technology	(5.6)	(9.3)	(12.1)	(18.2)	(24.5)	(30.1)	(36.8)	(40.1)	(34.8)
Heavy industry	(-0.2)	(2.4)	(10.1)	(14.0)	(19.6)	(24.1)	(30.4)	(29.8)	(28.2)
Transportation equipment	(3.8)	(6.0)	(21.0)	(34.1)	(45.6)	(57.0)	(64.9)	(64.6)	(70.1)
Construction and agriculture	(-12.8)	(14.8)	(15.5)	(39.8)	(23.6)	(26.2)	(21.9)	(27.9)	(18.2)
Other	(-1.8)	(2.4)	(9.8)	(17.4)	(17.9)	(21.7)	(22.9)	(25.1)	(25.9)
Nonresidential structures	-5.5	-7.3	-6.9	-0.9	4.4	9.6	10.1	14.6	17.2
Commercial	(-5.8)	(-8.3)	(-2.5)	(0.4)	(13.0)	(26.5)	(28.1)	(41.2)	(49.8)
Public utilities	(-5.7)	(-4.4)	(-10.6)	(1.5)	(0.4)	(4.3)	(7.9)	(6.3)	(4.0)
Petroleum drilling and mining	(-4.2)	(-9.6)	(-13.4)	(5.6)	(-4.0)	(-6.1)	(-4.0)	(-2.9)	(-0.4)
Industrial	(-15.8)	(-21.9)	(-22.7)	(-32.6)	(-19.8)	(-17.9)	(-18.2)	(-14.3)	(-15.6)
Institutional <u>2/</u>	(2.6)	(1.1)	(5.8)	(13.3)	(24.0)	(25.9)	(16.9)	(15.8)	(13.2)
Farm	(-0.4)	(11.3)	(13.7)	(12.8)	(1.9)	(-11.7)	(-13.7)	(-17.4)	(-2.7)
Other <u>3/</u>	(12.7)	(22.2)	(23.0)	(17.2)	(32.7)	(50.3)	(62.6)	(88.9)	(112.1)

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

1/ High technology comprises office and store machinery (the great bulk of which is computers), communications equipment, scientific and engineering equipment, and photographic equipment. Heavy industry consists of steam engines, internal combustion engines, electrical transmission and distribution equipment, metal-working machinery, special industry machinery, general industry machinery, and fabricated metals. Transportation equipment includes trucks, passenger cars, aircrafts, ships and boats, and railroad equipment. Construction and agricultural comprises construction tractors and machinery and farm tractors and agricultural machinery; other includes service industry equipment, household and other furniture and appliances, mining and oilfield machinery, miscellaneous electrical, and other equipment and scrap.

2/ Includes religious and educational buildings, and hospitals.

3/ Comprises brokers' commissions, net purchases of used structures, and all other private nonresidential structures.

Table 2. United States: Selected Service Lives
By Type of Assets

Type of Asset	Service Life (years)	Share of Gross Fixed Business Investment (percent)	
		1958	1984
<u>Equipment</u>			
Office, computing and accounting machinery	8	2.5	19.2
Trucks, buses and trailers	9	4.2	6.2
Autos	10	4.4	8.2
Electrical and communi- cation equipment	14	3.4	8.1
<u>Structures</u>			
Industrial buildings	27	6.6	2.9
Commercial buildings	36	10.0	10.0
Institutional buildings	48	8.5	4.0
Public utilities	26-51	11.8	6.3

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Table 3. United States: Principal Legislative Changes
Affecting Business Fixed Investment, 1980-84

1981	<u>The Economic Recovery Tax Act (ERTA)</u> was passed in August 1981 but was applicable to investment after December 31, 1980. Its main points included: (i) the introduction of the Accelerated Cost Recovery System (ACRS) for calculating depreciation allowances. Under this system the number of asset depreciation classes allowed under the previous Asset Depreciation Ranges System (ADR) was lowered to four and the average length of tax lives was reduced. For equipment the average life is estimated to have fallen from 8.1 to 4.7 years; for structures the estimated decline is from 24.0 to about 11.0 years. Partly offsetting this shortening of tax lives was a change to less accelerated depreciation schedules. For equipment, the new 150 percent declining balance method was less generous than the previously allowed 200 percent declining balance and sum-of-years digits methods under ADR. More generous 175 percent declining balance methods were allowed for structures. Over the years 1983-86, the depreciation schedules were to become progressively more accelerated. (ii) The investment tax credit (ITC) was extended to some short-term assets not previously covered. For equipment, it is estimated that the average tax credit rose from 8.7 to 8.9 percent. (iii) Leasing laws were relaxed making it easier for a firm without current profits to take full advantage of investment tax allowances through intermediate leasing firms.
1982	<u>The Tax Equity and Fiscal Responsibility Act (TEFRA)</u> which was effective from January 1, 1983 contained the following changes: (i) The acceleration of depreciation schedules that had been proposed under ERTA was cancelled. (ii) The depreciable base of an asset was reduced by 50 percent of the value of the ITC.^{1/} (iii) Some of the "safe-harbor" leasing clauses of the ERTA were made more restrictive, although leasing was still comparatively easier than in the period before 1981.
1984	<u>The Deficit Reduction Act (DEFRA)</u>, with effect from March 16, 1984 increased the top depreciation tax life from 15 to 18 years.

^{1/} For example, in the case of an investment tax credit of 10 percent, the depreciable base of an asset became 95 percent of the purchase price.

Table 4. United States: Sources of Change in Business Fixed Investment

(As percent of investment in the fourth quarter of 1982)

Year	Actual Change	Normal Output Recovery	Change Attributable to:				Re- sidual
			Above Average Output Recovery	Lower Cost of Funds	Changes in Relative Prices	ERTA/ TEFRA	
A. <u>Nonresidential Fixed Investment</u>							
1983:IV	14.2	5.7	-0.4	2.2	1.0	0.5	5.2
1984:IV	32.4	14.3	6.5	4.5	2.6	1.5	3.0
1985:I	31.9	16.5	6.0	4.8	2.7	1.5	0.4
B. <u>Producers' Durables</u>							
1983:IV	21.3	9.4	-0.5	2.3	0.9	0.3	8.9
1984:IV	40.8	19.6	7.0	4.0	2.0	0.8	7.4
1985:I	38.8	21.5	6.3	4.4	2.0	0.5	4.1
C. <u>Nonresidential Structures</u>							
1983:IV	-0.9	1.0	-0.3	2.0	1.3	0.9	-4.9
1984:IV	14.6	6.5	5.4	5.5	3.8	2.9	-9.5
1985:I	17.2	9.0	5.3	5.7	4.0	3.0	-9.8

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CHART 1
UNITED STATES
BUSINESS FIXED INVESTMENT

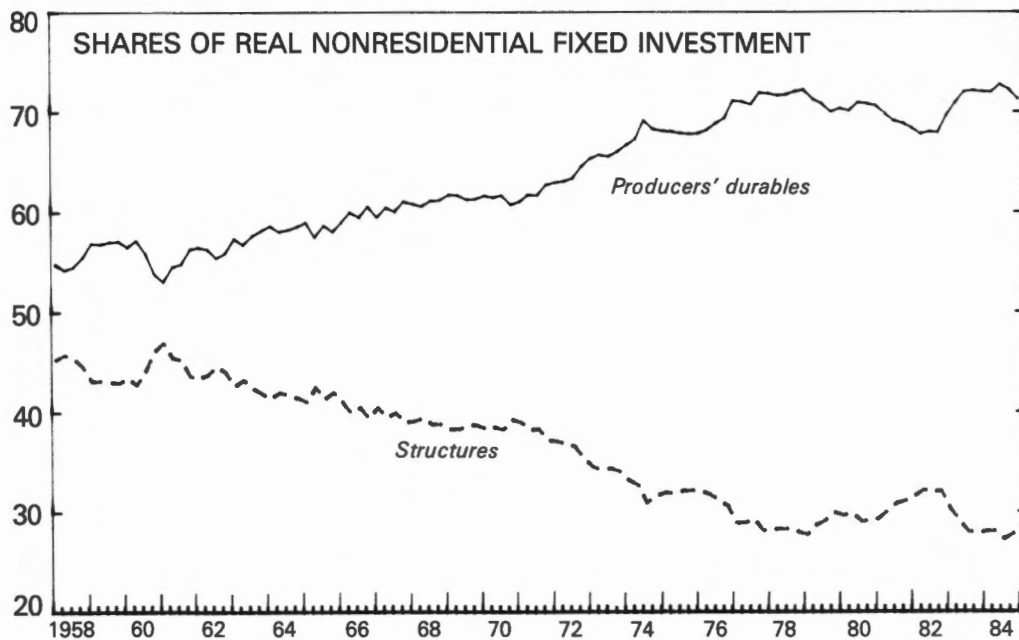
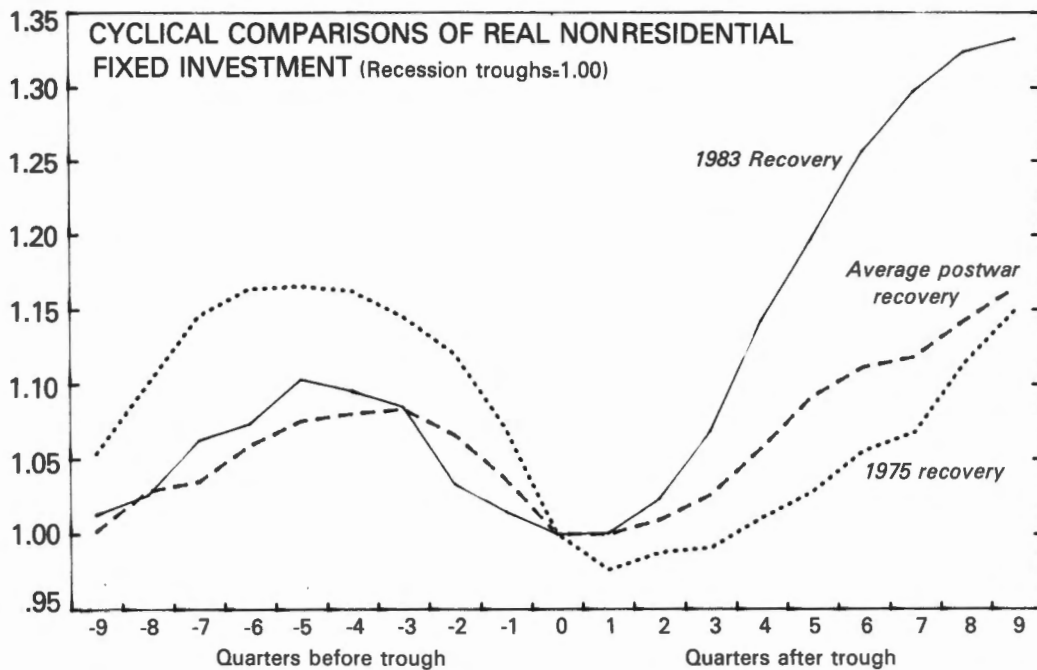


CHART 3
UNITED STATES
SHARES OF REAL NONRESIDENTIAL FIXED INVESTMENT

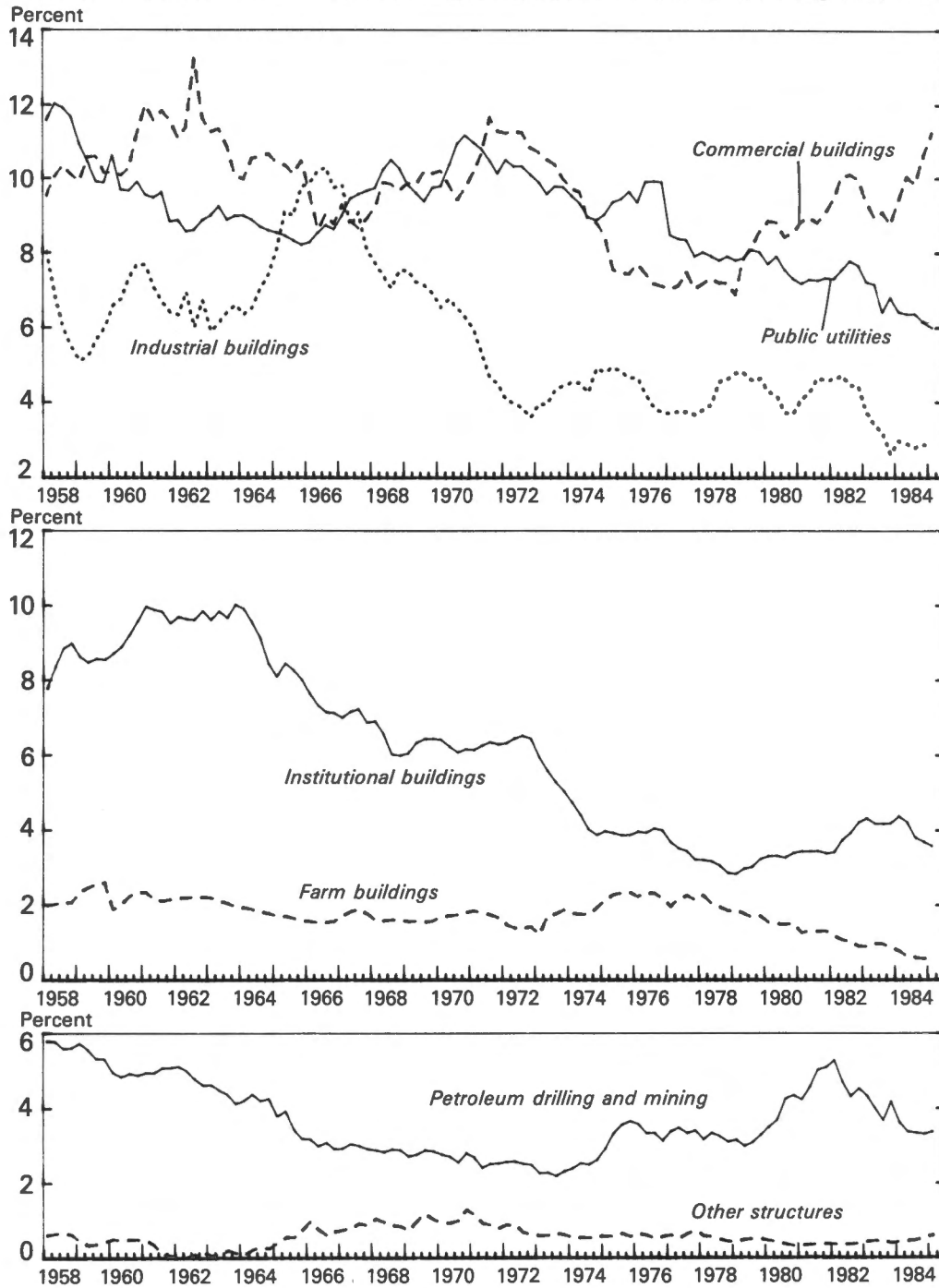


CHART 2
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SHARES OF REAL NONRESIDENTIAL FIXED INVESTMENT

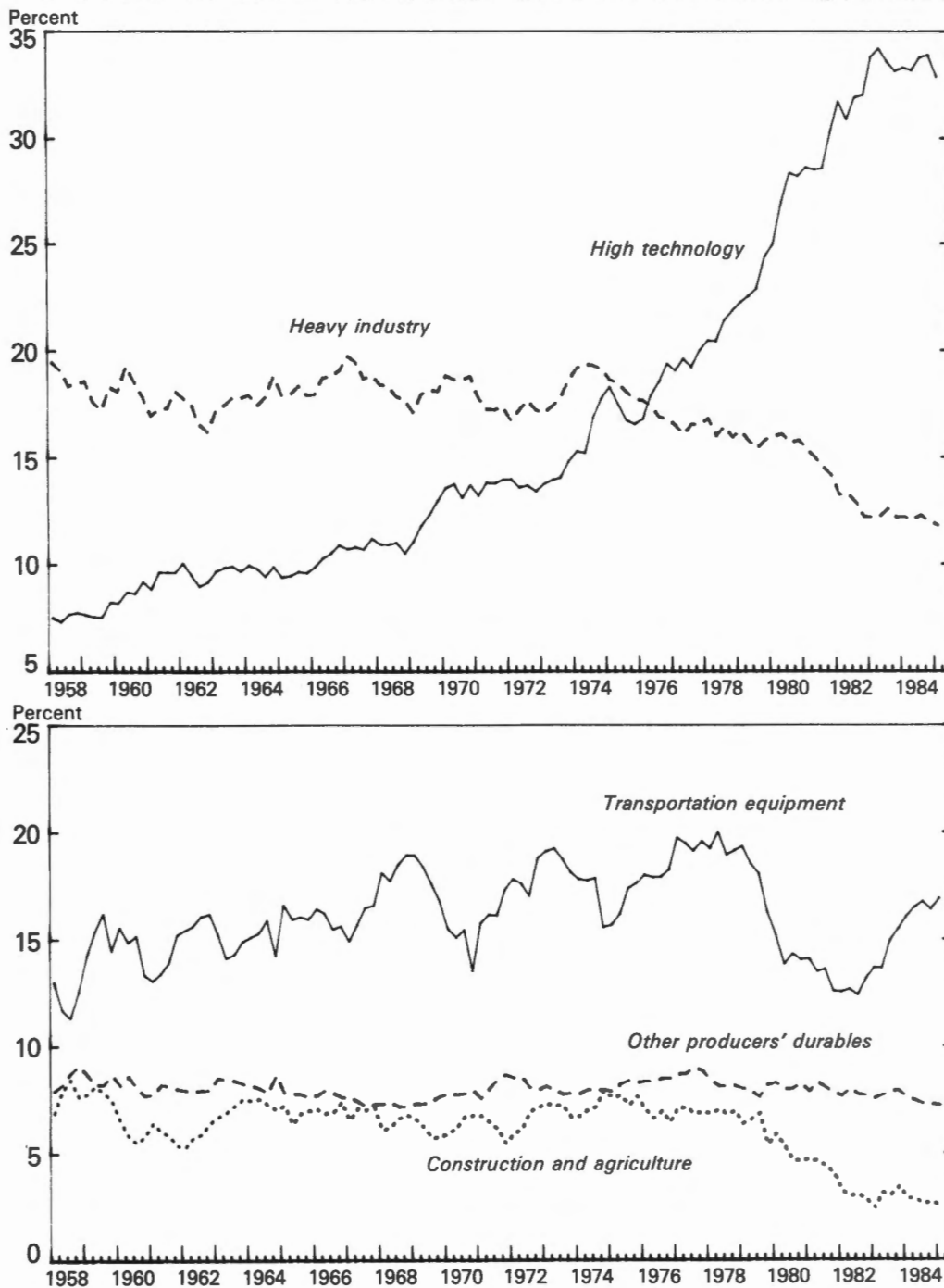


CHART 4
UNITED STATES
NONRESIDENTIAL FIXED INVESTMENT

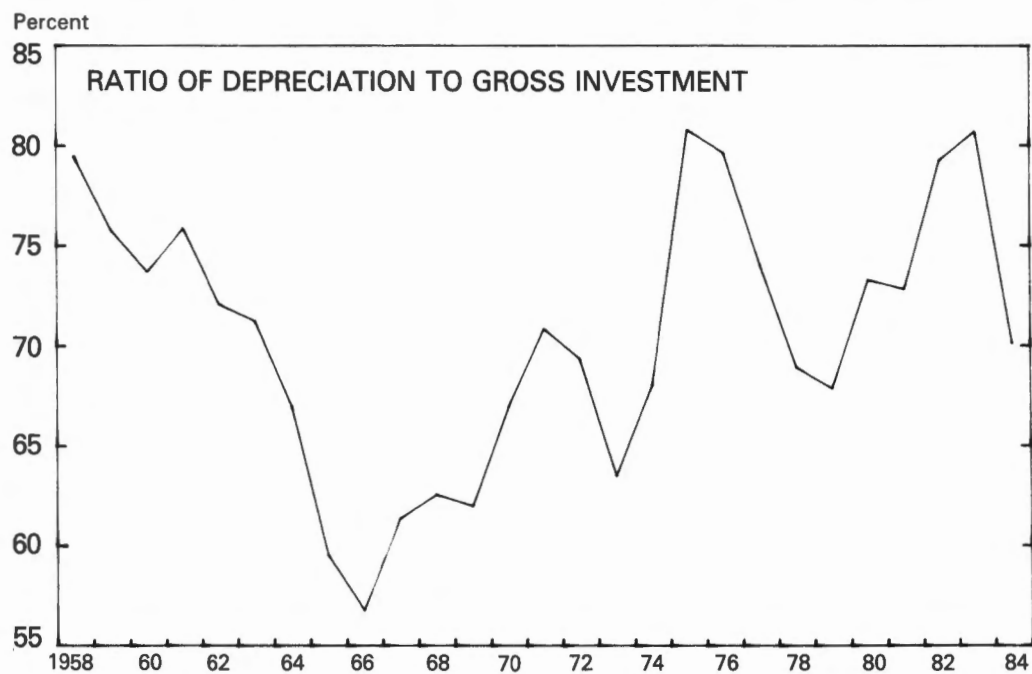
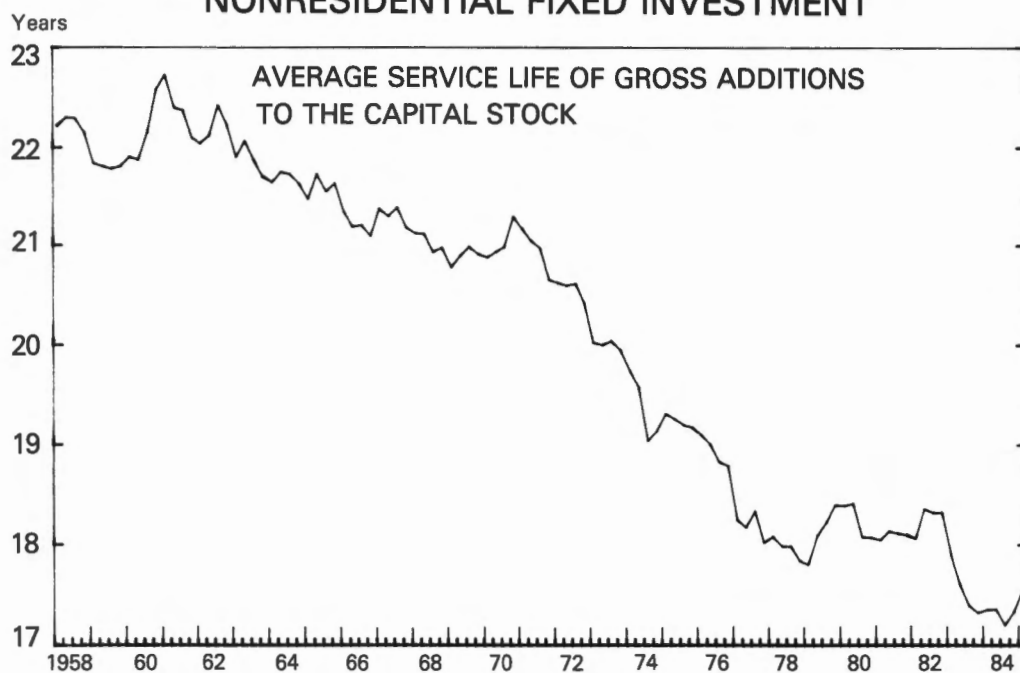


CHART 5
UNITED STATES
NONRESIDENTIAL FIXED INVESTMENT

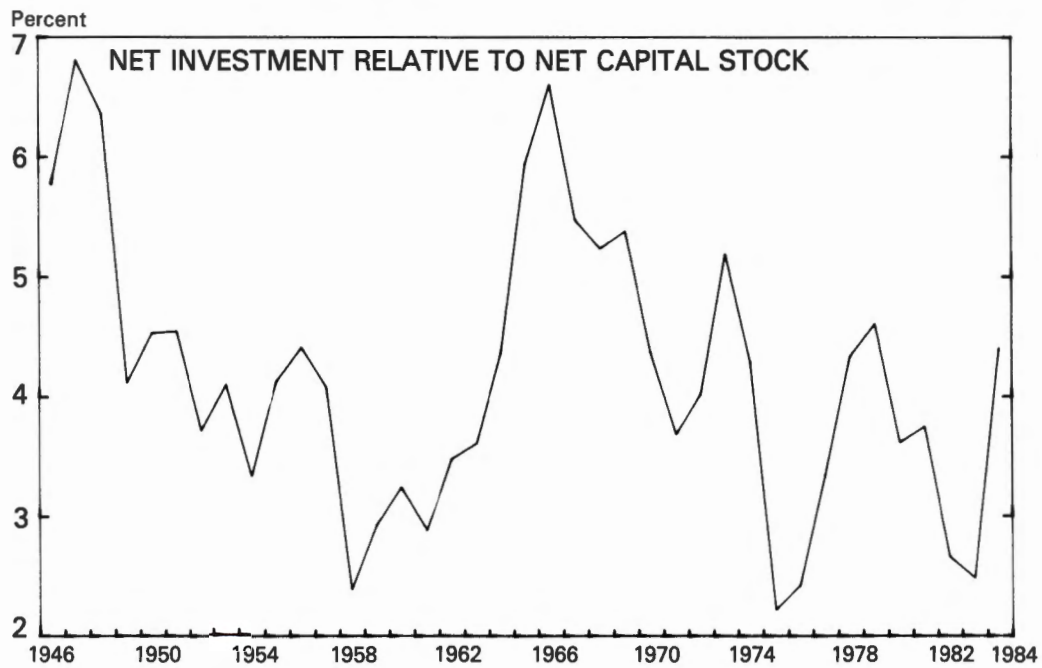
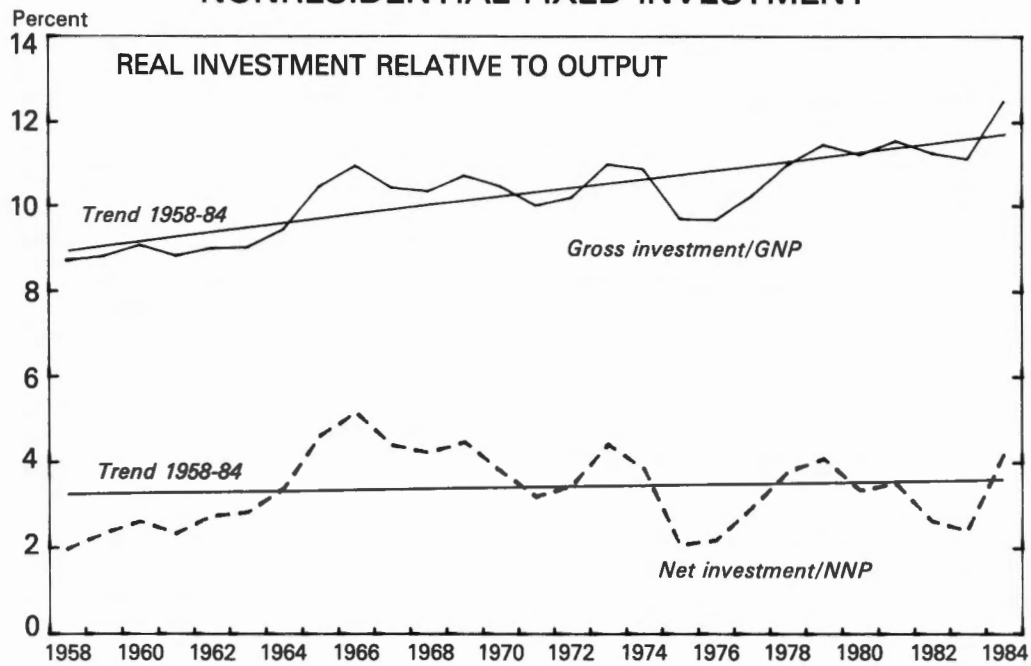
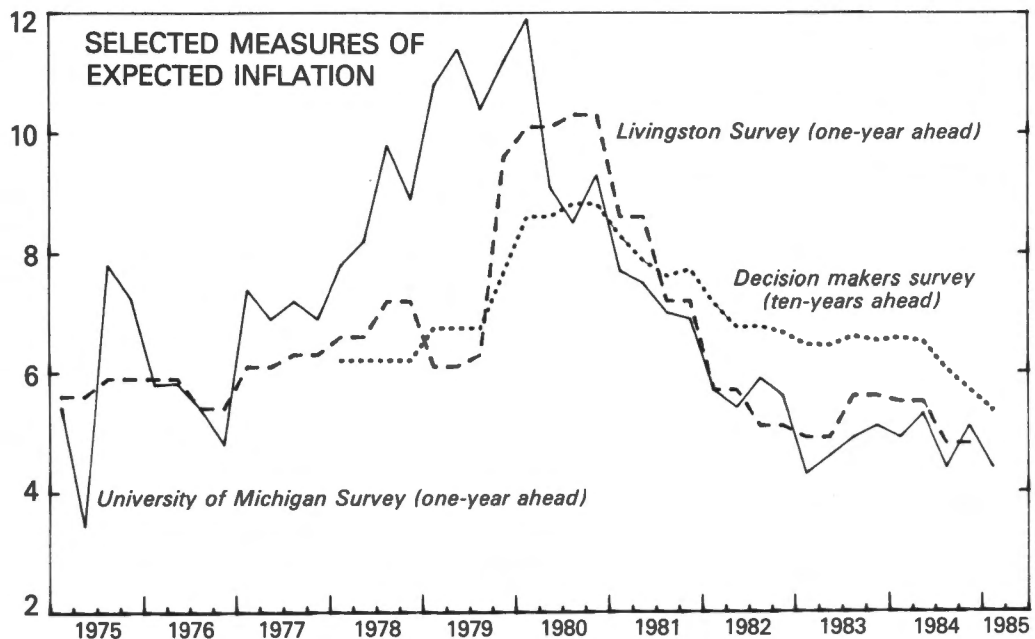
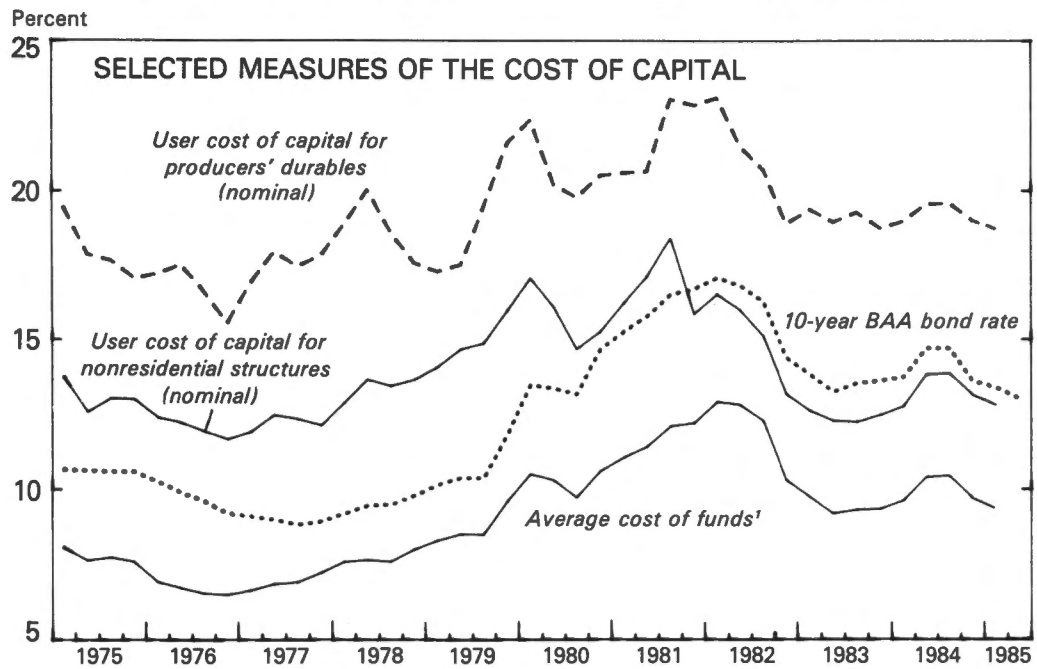
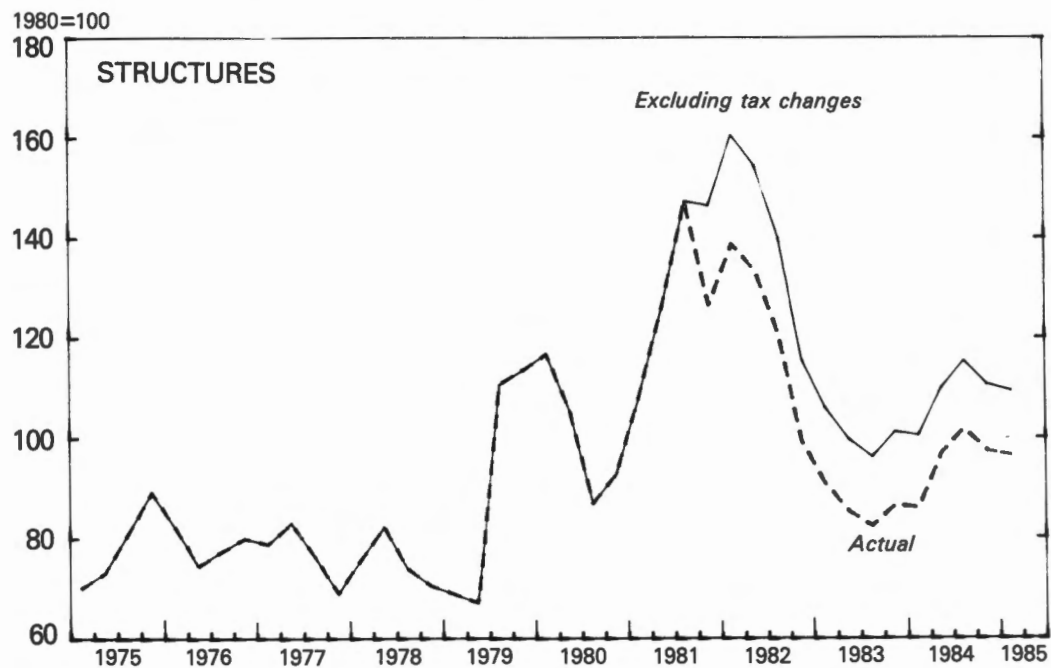
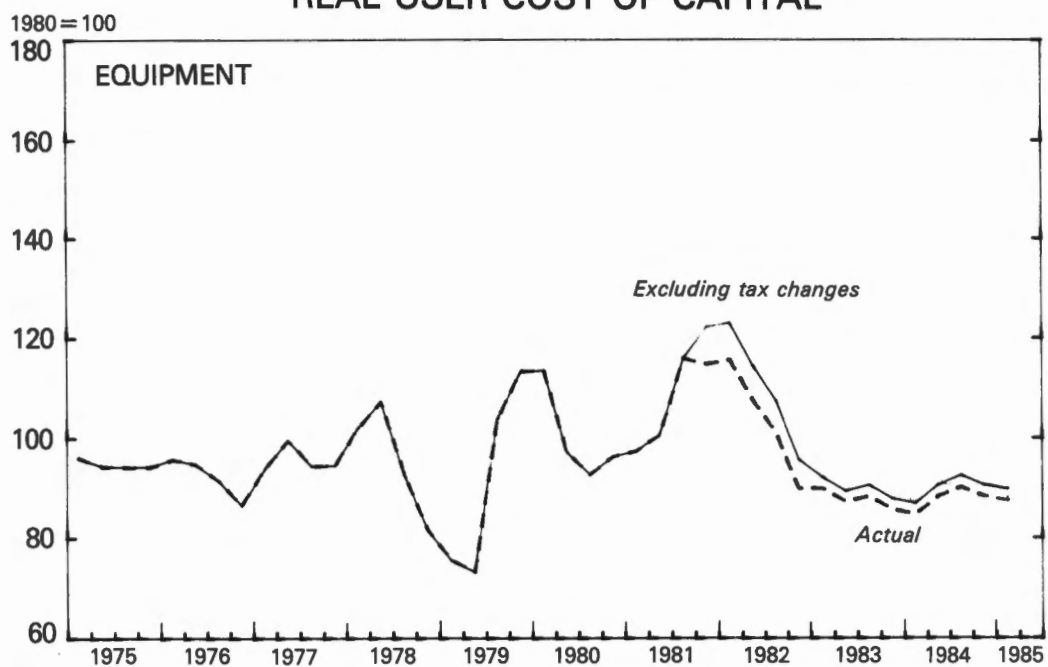


CHART 6
UNITED STATES
COST OF CAPITAL AND EXPECTED INFLATION



¹Weighted average of the BAA corporate bond rate, the dividend price ratio, and the three-month Treasury bill rate.

CHART 7
UNITED STATES
REAL USER COST OF CAPITAL



Recent Developments in Private Saving and the Effects of
Tax Reductions and Fiscal Incentives

One of the objectives of the Economic Recovery Tax Act (ERTA) of 1981 was to encourage private saving.^{1/} This objective was to be achieved in part through an across-the-board reduction in individual income tax rates over a period of 33 months: the rates were cut by 5 percent on October 1, 1981; by 10 percent on July 1, 1982; and by 10 percent on July 1, 1983. In addition, the top marginal tax rate on dividends and interest income was reduced from 70 percent to 50 percent on January 1, 1982. This reduction in individual tax rates was designed to offset the increase in income taxation resulting from the interaction between inflation and the progressive tax system in the 1970s; in addition to stimulating the supply of labor, the lower tax rates were intended to encourage private saving by increasing the real after-tax rate of return.

The major change in ERTA aimed directly at increasing personal saving was the extension of the opportunity to use Individual Retirement Accounts (IRAs) to all households. Under this legislation, an individual may contribute up to \$2,000 a year to an IRA regardless of whether he is already covered under an employer-sponsored pension plan. In addition, couples with only one wage earner can contribute up to \$2,250 a year. There are two tax advantages to IRAs. First, the contributions are deductible from taxable income, and the taxes that otherwise would have been paid are deferred until the funds are withdrawn from the account. Second, as long as the earnings are not withdrawn from the IRA account, the return on the investment is not subject to tax.^{2/}

Both the decline in personal income tax rates and the extension of the opportunities to hold IRAs lead to an increase in after-tax interest rates. In turn, an increase in after-tax interest rates has two distinct effects on saving. First, there is the substitution effect; the price of future consumption in terms of present consumption is reduced, thereby providing an incentive to increase saving. Operating in the other direction is the income effect. A cut in marginal tax rates directly raises disposable income; contributions to IRAs increase disposable income by an amount related to a household's marginal tax rate. If the tax changes are permanent, they would tend to increase both current and future disposable income, and thus lead to an increase in present consumption. The net effect of an increase in the after-tax rate of return on personal saving is therefore ambiguous.

^{1/} These personal tax cuts had a counterpart in ERTA in the form of incentives for business fixed investment. The effects of these incentives, particularly the Accelerated Cost Recovery System, on business fixed investment are analyzed in Appendix I.

^{2/} A complete description of the rules governing IRAs is contained in Fundamentals of Employee Benefit Programs, Employee Research Institute, 2nd edition, Washington, D.C., 1985, pp. 115-120.

In appraising the effectiveness of these personal tax measures in raising national saving, it is also important to take account of their impact on the federal fiscal position. Reductions in personal income tax rates, contributions to IRAs, and the tax status of earnings on IRA accounts all involve revenue losses. In evaluating the extent to which there has been any addition to the pool of national saving, it is important to compare the reduction in federal tax revenue brought about by these tax measures, which constitutes a decline in saving by the federal sector, with the increase, if any, in personal saving. The increase in saving by the household sector would have to be more than the loss in tax revenue for there to be a net positive effect on national saving.

This appendix is organized as follows. First, the recent behavior of the personal and the net private saving rate is examined. The second section contains a discussion of the ambiguity of the effect of changes in the after-tax rate of return on personal saving. Section 3 provides a brief review of the empirical literature on this topic and section 4 provides a description of the data on IRA contributions and holdings. Some econometric evidence on the extent to which changes in the real after-tax rate of return influenced personal saving over the period 1981-84 is presented in the following section.

1. Recent behavior of personal and net private saving

Chart 1 shows the ratio of household saving to personal disposable income since 1955.^{1/} After remaining in the range of 7-8 percent in the first half of the 1970s, the personal saving rate fell to around the 6 percent in the latter part of the 1970s. The personal saving rate rose to 6 3/4 percent in 1981, declined in the next two years to 5 percent in 1983, and then increased to about 6 percent in 1984. In the three years after the passage of ERTA in 1981, the personal saving rate averaged 5 3/4 percent, substantially less than the average of nearly 7 percent for the period from 1950 to 1980.

Chart 1 also shows an alternative measure of private saving that is used in the MPS econometric model of the Federal Reserve Board. The main difference between this measure and the personal saving rate is that the former includes corporate retained earnings. This measure of private saving, which has been on a pronounced downward trend since the mid-1960s, was also unusually low in the period 1980-84.

An estimate of the real after-tax rate of return is also depicted in Chart 1. This estimate indicates that the return to saving rose sharply in the early 1980s, as higher nominal interest rates and lower marginal tax rates offset by a wide margin the effect of the drop in expected inflation to levels that are quite high by the standards of the previous two and one half decades. As can be seen in Chart 1,

^{1/} The saving measures used in this Appendix are on a National Income and Product Accounts basis, not a flow of funds basis.

the above-average real after-tax rates of return from 1981 to 1984 were not associated with higher personal or private saving rates.

Thus the recent behavior of the personal saving rate does not indicate any obvious positive impact of the tax measures contained in ERTA. On the contrary, personal and net private saving rates in recent years have been somewhat lower than the postwar average. Of course, the effect of these measures on the saving rate cannot be inferred from the chart, as such an effect may have been outweighed by the impact of other factors. An attempt is made in section 5 below to isolate the influence of changes in the after-tax rate of return on net private saving in recent years.

2. Effects of the after-tax rate of return on saving: theory

The effect on saving of a change in the after-tax rate of return can be analyzed in the context of with a simple two-period model.^{1/} In this model, an individual's lifetime is divided into two periods; in the first period the individual works and chooses the allocation of his income (W) between current (C_1) and future consumption (C_2); in the second period the individual retires and consumes the amount saved in the first period plus interest earnings. Denoting the after-tax interest rate by r , consumption in the second (i.e., retirement) period is given by:

$$C_2 = (W - C_1) (1 + r) \quad (1)$$

The equation can be rewritten in the form of a budget constraint:

$$C_1 + C_2/(1+r) = W. \quad (2)$$

In this form, it is easy to see that the "price" of future consumption in terms of present consumption forgone is $1/(1+r)$; as the after-tax rate of return increases, a smaller reduction in current consumption is needed to attain a given level of consumption in the future.

The effect of a change in the rate of return on consumption and saving is depicted in Chart 2. The individual's budget constraint is represented by a straight line with a slope equal to $-(1+r)$. Thus an increase in r raises the slope of the budget line and improves the terms on which resources acquired in the current period can be transformed into future consumption. The indifference curves describe the individual's preferences regarding consumption in the two periods. If the individual regards consumption in period 2 as a poor substitute for current consumption, the indifference curves will be as shown in the upper panel of Chart 2. If, on the other hand, future and current consumption are close substitutes (i.e., the individual does not have strong preferences with regard to when consumption takes place), the indifference curves will be as depicted in the bottom panel of the Chart.

^{1/} This model is described in detail in Atkinson and Stiglitz (1980), pp. 62-96. An extensive discussion of the theoretical and empirical aspects of this topic is provided by Bosworth (1984), pp. 59-96.

Turning first to the situation depicted in the upper panel, an increase in the after-tax rate of return shifts the individual's desired combination of C_1 and C_2 from point A to point C. Hence, the increase in r results in a reduction in saving in period 1 and an increase in both C_2 and C_1 . The reason for this is that the pure substitution effect of the change in r --the movement from A to B, where a budget line with the same slope as the new one is tangent to the initial indifference curve--is rather small in comparison with the income effect, i.e., the movement from B to C. The important point is that an increase in the rate of return brought about by a cut in taxes on earnings from capital raises the disposable income of wealth-holders; if the substitution effect is small, relative to the income effect present consumption will increase.

If the substitution effect is large relative to the income effect, as depicted in the lower panel of Chart 2, an increase in r will reduce current consumption. In this situation, the reduction in the relative price of C_2 generates a large pure substitution effect represented by the movement from A to B. Here the individual has weak preferences regarding the timing of consumption, and is willing to change his intertemporal pattern of consumption substantially in response to the change in the relative price of consumption. As can be seen in the chart, the substitution effect significantly outweighs the income effect--the movement from B to C. Consequently the net effect of the increase in r is that the individual shifts from point A to point C, reducing present consumption.

In conclusion, this theoretical analysis indicates that the effect of a change in the real after-tax rate of return on saving is ambiguous. The result depends on the degree to which individuals are willing to substitute present for future consumption in response to variations in the after-tax rate of return on saving.^{1/}

3. Effects of the after-tax rate of return on saving: empirical evidence

Given the theoretical indeterminacy of the effect of the real after-tax rate of return on saving, attempts have been made to establish empirically the direction and magnitude of this effect. A review of this literature indicates that no consensus has emerged with regard to the impact of interest rates on saving.^{2/} A majority of these studies

^{1/} In the model presented above, the elasticity of saving with respect to the rate of return is given by $r(1-s)(\sigma-\eta)/(1-r)$, where s = saving rate, σ = elasticity of substitution between present and future consumption, and η = elasticity of first-period consumption with respect to the individual's resources. See Atkinson and Stiglitz (1980, pp. 76-77).

^{2/} A number of surveys of this literature are available. See Gylfason (1981), Jackson (1981), and Sturm (1983).

find that saving is positively related to interest rates. However, a number of these studies do not adjust interest rates for inflation or for taxes. Thus, considerable uncertainty still remains regarding the effect on private saving of an increase in the real after-tax rate of return associated with a reduction in marginal tax rates.

In one of the most widely quoted studies, Boskin (1978) found a significant interest rate effect in a regression relating consumption to total disposable private income, wealth, the unemployment rate, and the real after-tax rate of interest. His results implied that the elasticity of saving with respect to the real after-tax rate of return was about 0.4. One problem with Boskin's study, as well as others, is that it includes as separate explanatory variables the interest rate and disposable income. Because interest income is also included in disposable income, it is not possible to appraise the net effect of a change in the real after-tax rate of interest on consumption and saving from his results.

Howrey and Hymans (1978) criticized the Boskin study on the grounds that his results were quite sensitive to relatively small changes in the period of estimation and in the specification of the estimating equation. When they limited the sample period to the postwar period and used alternative interest rates, the effect of a rise in interest rates on consumption was often positive, i.e. the opposite of Boskin's finding. Howrey and Hymans themselves focused on the effect of interest rates on what they call personal cash saving (the individuals' direct contribution to the loanable funds available for business capital formation), as they believed that this concept was more relevant for discretionary saving decisions.^{1/} Using this approach, they were unable to find a significant interest rate effect. Their study was criticized, however, on the grounds that their concept of saving ignored important components of changes in an individual's net worth that were relevant in determining saving behavior.^{2/}

A recent critique of Boskin's study and alternative empirical estimates have been provided by Friend and Hasbrouck (1983). These authors experimented with alternative equations in which consumption is related to private permanent income, transitory income, wealth, and a measure of the after-tax real rate of return. This latter variable was represented by the average yield on municipal bonds less a proxy for expected inflation. The use of a tax-free interest rate was designed to avoid having to adjust a taxable yield for changes in tax rates. Friend and Hasbrouck found that in most cases consumption was positively and significantly related to the real after-tax interest rate, a result that was at odds with Boskin's findings.

^{1/} This measure of saving is equal to NIPA personal saving, excluding net imputed investment in owner-occupied housing, minus changes in reserves of private pension and insurance flows (flow of funds data).

^{2/} See the comments by discussants on the paper by Howrey and Hymans (1978), pp. 686-700.

4. Individual retirement accounts and personal saving

As mentioned above, one feature of the Economic Recovery Tax Act of 1981 included a significant liberalization of the regulations relating to individual retirement accounts (IRAs). Effective from January 1, 1982, eligibility for IRAs was expanded to include all employees; this change meant that employees covered by employer pension plans, and were therefore previously ineligible to hold IRAs, could now make contributions to an IRA. In addition, the maximum contribution per year was raised from \$1,750 to \$2,000 for each employee and to \$2,250 for a couple with a nonworking spouse.

The liberalization of the provisions relating to IRAs was associated with a large increase in the public's holdings of these tax-sheltered accounts (see tabulation below). In less than three and one half years, IRA accounts increased over six-fold. While other factors may have accounted for the rapid increase in these financial instruments, it seems likely that the changes in ERTA affecting IRAs played a major role.

Holdings of Individual Retirement Accounts 1/

(In billions of dollars)

<u>1981</u>	<u>1982</u>	<u>December</u> <u>1983</u>	<u>1984</u>	<u>April</u> <u>1985</u>
26.7	55.3	96.0	144.0	170.0

While the new tax benefits associated with IRAs provided considerable incentives to open and hold such accounts,^{2/} it is not clear whether such incentives have actually generated an increase in private saving. For many investors who hold liquid assets that they wish to invest for a long period, the \$2,000 limit on annual contributions means that the higher rate of return on an IRA account is an intra-marginal, not a marginal return. Thus, many wealth-holders may rearrange existing portfolios to take advantage of the tax-saving benefits of IRAs, or to save in the form of an IRA account what they would have saved in any case. The conclusion drawn by De Magistris and Palash (1982-83 and 1984) was that any increase in private saving generated by the opportunity to invest in IRAs, was likely to be quite small.

^{1/} These estimates were provided by the IRA Reporter and were obtained from surveys of all institutions that offer IRA accounts. Thus these figures are more comprehensive than those reported in the Federal Reserve Board's H6 release because they include IRA accounts with life insurance companies, mutual funds, and brokerage firms.

^{2/} For estimates of the improvement in the after-tax rate of return provided by an IRA account, see De Magistris and Palash (1983).

Surveys of IRA holdings provide some support for this hypothesis. For example, an analysis undertaken by the Employee Benefit Research Institute (1984) of the 1983 Current Population Survey found that 53 percent of those holding IRAs in 1982 did so in order to obtain a tax deduction, whereas 38 percent of the respondents in the survey indicated that they were mainly interested in using IRAs for retirement purposes. Also, 54 percent of the respondents indicated that funds contributed to IRAs in 1982 came from existing savings, while 43 percent said that the contributions were from current earnings. In addition, the survey found that nearly 58 percent of respondents contributed the maximum permissible amount of \$2,000 to an IRA account.

The 1983 Survey of Consumer Finances also provides information about IRA holdings.^{1/} Table 1 shows that the percentage of families holding IRAs or Keogh accounts rises rapidly as family income increases. Table 2 shows that holdings of financial assets at all income levels, but especially at the high income end, are sufficient to permit considerable further shifts from existing assets into IRAs without the need to curtail consumption in order to finance additional IRA contributions.

These survey results obviously do not provide any clear-cut evidence whether the tax incentives associated with IRAs have generated additional private saving. Analysis of personal saving that takes specific account of these incentives will be necessary to answer this question.^{2/} Nonetheless, the surveys mentioned above--and the theoretical ambiguity described above concerning the direction of the effect of a change in the real after-tax rate of return on saving--suggest that the impact of IRAs on personal saving may not be very large.

^{1/} See "Survey of Consumer Finances, 1983", in the Federal Reserve Bulletin, September 1984, pp. 679-692

^{2/} In the only explicit statistical analysis related to IRAs and saving, Hubbard (1984) finds that households with access to IRAs have higher observed ratios of wealth to permanent incomes. As Hubbard himself admits, identifying the new saving component of contributions to IRAs is impossible without data on the contributions themselves. Such data were not available to Hubbard for his analysis.

Table 1. United States: Ownership of Selected Assets
by Families, 1983

(percentage of families)

	Checking Account	Savings Account	Money Market Account	Certifi- cates of Deposit	IRA or Keogh Account
<u>Family income</u> <u>(dollars)</u>					
Less than 10,000	53	39	3	10	2
10,000-19,999	77	59	10	19	7
20,000-29,999	88	72	12	21	16
30,000-49,999	94	78	21	26	30
50,000 and more	97	75	36	36	55

Source: Federal Reserve Bulletin, September 1984, p. 687.

Table 2. United States: Median Value of Holdings of Selected Assets, by Family Income, 1983

(In dollars)

	Liquid Assets					Other Financial Assets				
	Checking Accounts	Savings Accounts	Money Market Accounts	Certificates of Deposit	IRA or Keogh Accounts	Savings Bonds	Stocks	Bonds	Nontaxable Holdings	Trusts
<u>Family income</u> <u>(dollars)</u>										
Less than 10,000	300	500	3,160	5,799	2,000	205	1,957	1,827	6,923	3,282
10,000-19,999	400	840	5,250	13,250	2,500	200	3,500	10,000	12,240	2,654
20,000-29,999	500	1,100	7,250	11,902	2,000	300	2,000	6,250	3,000	5,750
30,000-49,999	625	1,500	6,000	10,000	3,332	475	3,250	8,500	6,500	10,000
50,000 and more	1,700	3,837	14,000	18,046	4,500	500	13,512	20,000	26,604	15,000
All families	500	1,151	8,000	10,000	4,000	325	4,016	10,000	14,125	10,000

Source: Federal Reserve Bulletin, September 1984, p. 688.

5. Effects of the after-tax rate of return on saving in the early 1980s.

The empirical results cited above on the effects of the after-tax rate of return on saving covered a period that does not include the recent experience of high real interest rates. The sample period of the most recent empirical research on this topic extends only through 1980. It is therefore desirable to extend the sample period through 1984 to ascertain whether, after accounting for other factors affecting saving, the large upward movement in the real after-tax rate of return had any discernable impact on saving behavior.

The consumption function used for this updating was basically the same form as that recently employed by Bosworth.^{1/} It includes a proxy for the real after-tax rate of return in the consumption function that is used in the Federal Reserve Board's MPS econometric model.^{2/} This function is based on the life-cycle model of consumption which assumes that individuals plan their current and future consumption so as to maximize expected utility subject to their intertemporal budget constraint. From this assumption it follows that an individual's consumption is proportional to the present value of expected lifetime resources, which includes the present value of expected after-tax labor income, the present value of transfer payments and current wealth. The present value of current and expected future property income is included in the current value of wealth. Expected future values of labor income and transfer payments are assumed to be functions of current and past values of these variables. This approach leads to a consumption function of the following form:

$$CON = a YLABOR + b YTRANS + c WEALTH \quad (3)$$

where:

CON = real personal consumption expenditures
YLABOR = real after-tax labor income
YTRANS = real transfer payments
WEALTH = real household net worth.

The coefficients a, b, and c are, in principle, functions of the real after-tax rate of interest, the age structure of the population, and the expected growth rate of income. However, in the empirical implementation of this approach in the MPS model, the only behavioral influence on the coefficients that enters the equation is a linear dependence of the wealth coefficient on the rate of interest:

^{1/} See Bosworth (1984), p. 81.

^{2/} The equation is described in Brayton and Mauskopf (1985), pp.30-38.

$$c = c_0 + c_1 \text{ RATE} \quad (4)$$

where RATE = real after-tax interest rate. Combining equations (3) and (4) gives:

$$\text{CON} = a \text{ YLABOR} + b \text{ TRANS} + c_0 \text{ WEALTH} + c_1 \text{ RATE} * \text{WEALTH} \quad (5)$$

The coefficients a, b, and c_0 are positive, whereas the sign of c_1 is ambiguous.

Equation (5) was estimated with annual data over the period 1954-1984 with a first-order correction for autocorrelated errors. The estimation results are presented below, with t statistics given in parenthesis:

$$\begin{aligned} \text{CON} = & 0.708 \text{ YLABOR} + 0.136 \text{ YLABOR}_{-1} \\ & (6.7) \quad (1.4) \\ & +0.041 \text{ WEALTH}_{-1} + 1.687 \text{ TRANS} \\ & (3.8) \quad (9.5) \\ & -0.029 \text{ RATE}_{-1} \\ & (-0.7) \\ \bar{R}^2 = & 0.9979 \quad \text{DW} = 1.50 \quad \text{RHO} = 0.902 \\ & \quad \quad \quad (9.4) \end{aligned}$$

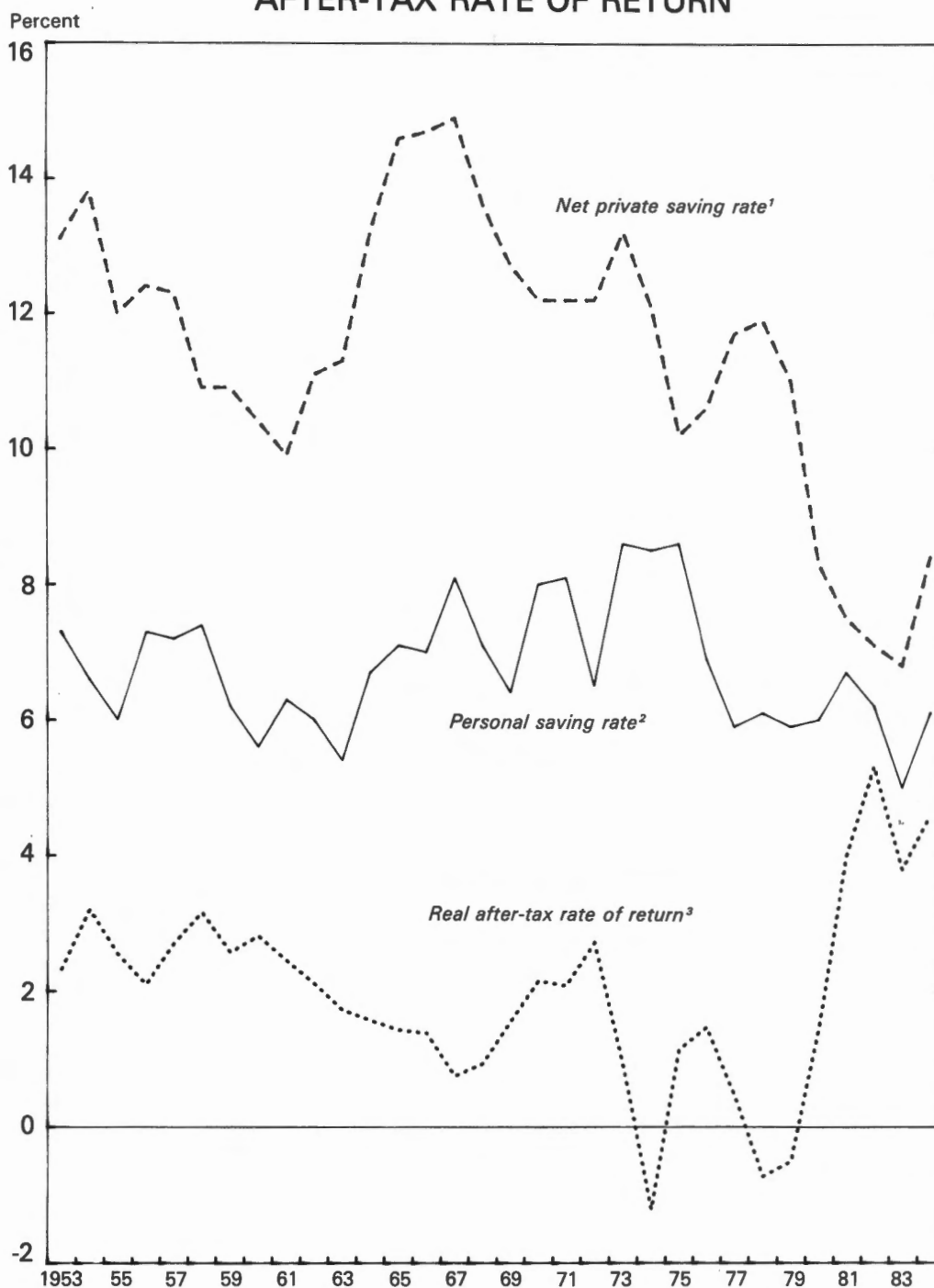
When Bosworth (1984, p.81) estimated his version of this equation over the period 1952-1980, he found a statistically significant ($t = 2.2$) negative effect of the real after-tax rate of interest on consumption. Attempts to duplicate his results by estimating the above equation over the period 1954-1980 were unsuccessful; none of the variants of the basic equation yielded a negative effect of the real after-tax interest rate on consumption. The other variables, however, all had the same signs as in Bosworth's results and were all statistically significant. The failure to duplicate Bosworth's finding for the real after-tax return indicates that the estimation results for this variable are quite sensitive to the choice of estimation period and fairly small variations in the definitions of the explanatory variables included in the equation.

The regression results reported above show that when the sample period is extended through 1984, the real after-tax interest rate again fails to appear as a significant determinant of consumption spending. An examination of the residuals for the years 1981-1983 showed that there was no tendency for the equation to overpredict consumption when real after-tax interest rates were unusually high. In all three years the residuals were less than one standard error of the regression.

Thus these results indicate that a fairly standard consumption function can account for the behavior of consumption in the recent past, and there appears to be no significant role for the real after-tax rate of interest in explaining consumption and therefore personal saving.^{1/}

^{1/} The apparent saving puzzle in the early 1980s has been discussed recently by Tanzi and Sheshinski (1984). Their explanation for the relatively low saving rate is that individuals over 65 have disproportionately high holdings of financial assets and an above-average marginal propensity to consume. They argue that the sharp fall in nominal interest rates between 1981 and 1983 gave holders of long-term financial assets sizable capital gains in addition to the gains associated with high real interest rates. The net result was a shift of income and wealth to older individuals; the increased consumption by these older individuals more than offset the reduced consumption of those who suffered capital losses.

CHART 1
UNITED STATES
PRIVATE SAVING AND THE REAL
AFTER-TAX RATE OF RETURN



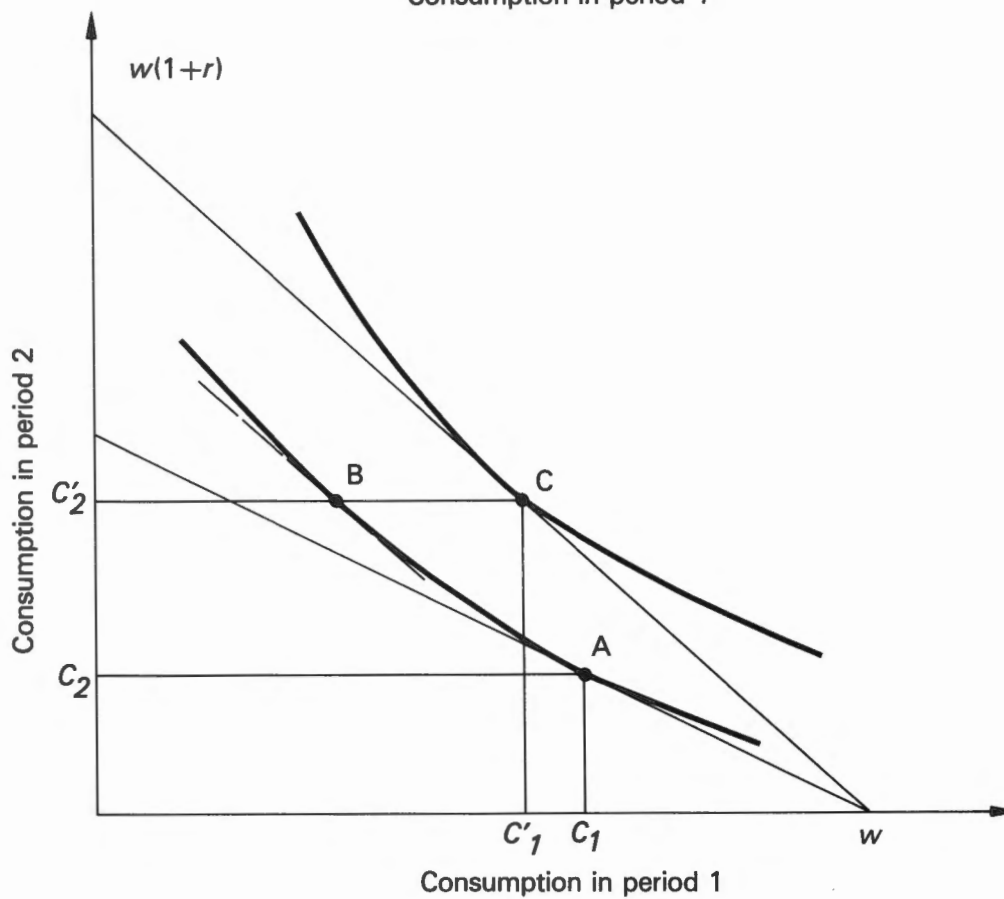
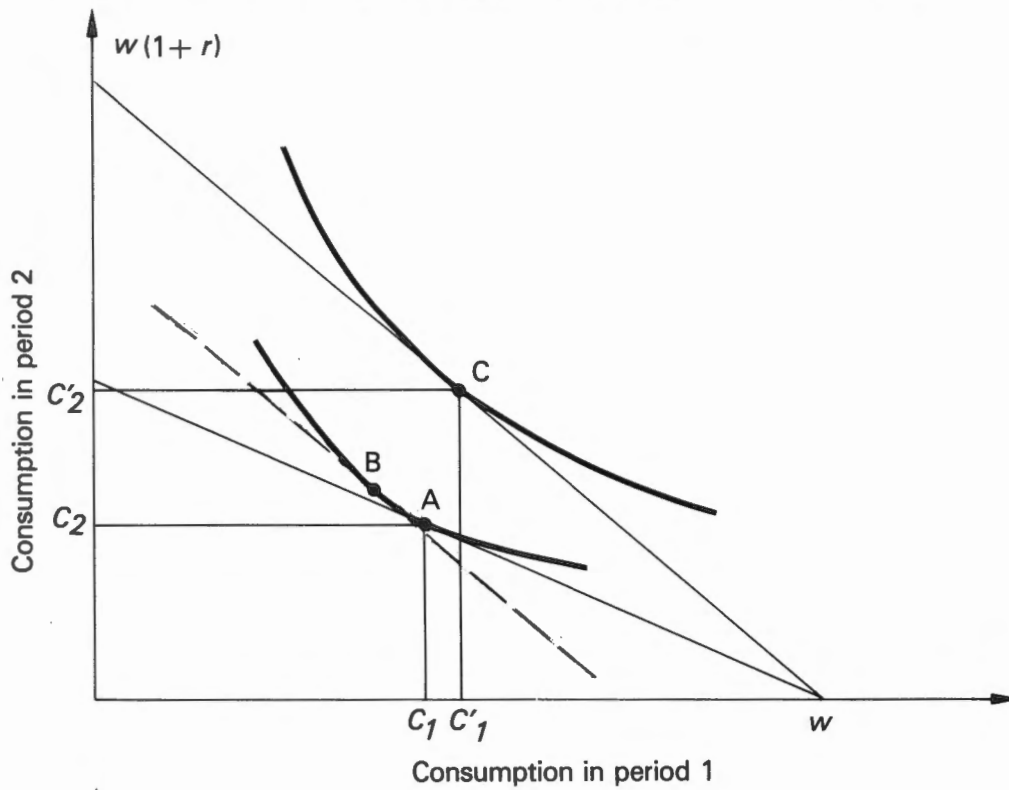
¹ Saving divided by income, both as defined in the MPS model. Saving equals income minus consumption, where income equals the sum of labor, transfer and property income (defined to include corporate retained earnings and the imputed net rental value of the stock of consumer durables), and where consumption equals personal consumption expenditures on nondurable goods and services (on a national income accounts (NIA) basis) plus the imputed gross rental value of the stock of consumer durables.

² Personal saving divided by personal disposable income on a national income account (NIA) basis.

³ After-tax yield on Moody's BAA corporate bond less a measure of expected inflation defined in section 5 below.

UNITED STATES

INTERTEMPORAL CONSUMPTION AND THE RATE OF RETURN



Definitions of Variables

All variables except RATE were taken from the MPS data bank. The definitions of these variables are given below. All variables except RATE are expressed in per capita terms in 1972 dollars.

CON = spending on nondurable goods and services plus the imputed gross rental value of the stock of consumer durables. The gross rental value is the sum of the depreciation rate and the real after-tax interest rate times the stock of consumer durables.

YLABOR = labor income estimated in the MPS model as personal income minus interest paid by consumers to business, farm proprietors' profits, transfer payments, and taxable property income. This income measure was converted to an after-tax basis using the MPS model's estimated average tax rate for federal, state, and local personal income taxes.

TRANS = federal, state and local transfer payments plus unemployment insurance benefits.

WEALTH = household net worth, which consists of net financial and tangible assets directly owned by the household sector plus their holdings through ownership of noncorporate businesses. Net financial assets include the market value of the equity in corporate businesses held by the household sector. Tangible assets include consumer durables, housing and land.

RATE = an estimate of the real after-tax rate of interest. The interest rate used is the yield on Moody's BAA corporate bonds. An estimate of the average marginal tax rate was obtained by multiplying the average income tax rate described above by an estimate of the elasticity of the individual income tax with respect to adjusted personal income contained in the Survey of Current Business, November 1980, p. 35, with estimates from 1981 through 1983 provided by Frank de Lleuw. The elasticity for 1984 was assumed to be the same as 1983. The expected inflation variable is based on survey data for expectations of consumer price inflation 10 years ahead. Details on the construction of this variable are given in Appendix I.

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Union Wage Concessions: Recent Developments

During the period 1981-84, at least 3 1/3 million members of labor unions in the United States--or almost one out of every three that signed a major wage agreement during this period--accepted contract modifications that either reduced or placed a freeze on nominal wages. This wave of "concession bargaining" (as these contract modifications are often called) is examined in this Appendix.^{1/} Section 1 briefly describes the evolution of wage concessions in the private sector;^{2/} section 2 reviews some of the factors influencing concessions; and section 3 examines the implications of these concessions for aggregate wage inflation (including empirical evidence on the issue).

1. Evolution of wage concessions

In 1979, the United Auto Workers, in recognition of the fragile financial condition of Chrysler Corporation, agreed to defer pay adjustments that had previously been negotiated with Ford and General Motors. This agreement marked the beginning of a period of unprecedented wage concessions by U.S. labor unions (top panel of Chart 1).^{3/} Initially, wage concessions were confined to a few financially troubled firms (such as Chrysler) and concessions virtually disappeared in 1980. In 1981, however, workers' perceptions of their companies' long-term prospects appear to have changed, as the economy weakened and the U.S.

^{1/} There have been previous episodes of union concessions (most notably in the early 1960s when the meat-packing industry was experiencing financial problems) but none were as widespread or prolonged as the most recent episode.

^{2/} Concession bargaining also has taken place in the public sector, but it has been less extensive than in the private sector and it has been concentrated in a few states. Mitchell (August 1984) studied these developments and concluded that public sector concession bargaining does not appear to mark a fundamental change in collective bargaining.

^{3/} It is difficult to define concessions in a precise way owing to the adversarial nature of negotiations during collective bargaining. One operational definition, which has gained wide acceptance, is to classify as concessions only those contracts in which the basic wage is either frozen or reduced for the first year of the agreement. This definition is used in this appendix. It should be noted that such a definition will tend to understate the number of concessions in high inflation years such as 1979 and 1980 and overstate them in relatively low inflation years such as 1984. If the definition of concessions were broadened to include freezes or cuts over the life of contracts (rather than just in the first year of the agreement), the incidence of wage concessions would not change materially.

dollar climbed. In that year, roughly 170,000 union members reached agreements that incorporated first-year wage cuts or freezes (see tabulation below).^{1/}

Workers Covered by Wage Concessions ^{2/}

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985:I</u>
	(thousands of workers)						
<u>Total concessions</u>	<u>155</u>	<u>--</u>	<u>168</u>	<u>1,499</u>	<u>1,168</u>	<u>533</u>	<u>48</u>
<u>Wage cuts</u>	<u>--</u>	<u>--</u>	<u>104</u>	<u>67</u>	<u>476</u>	<u>123</u>	<u>10</u>
Manufacturing	--	--	72	35	336	9	...
Nonmanufacturing	--	--	32	32	140	115	...
<u>Wage freezes</u>	<u>155</u>	<u>--</u>	<u>64</u>	<u>1,382</u>	<u>692</u>	<u>410</u>	<u>38</u>
Manufacturing	--	--	32	865	271	121	...
Nonmanufacturing	155	--	32	517	421	289	...
All workers under settlements	3,492	3,791	2,382	3,296	3,090	2,306	173

(As percent of all workers covered by major collective bargaining agreements)

<u>Total concessions</u>	<u>4</u>	<u>--</u>	<u>7</u>	<u>44</u>	<u>37</u>	<u>23</u>	<u>28</u>
<u>Wage cuts</u>	<u>--</u>	<u>--</u>	<u>4</u>	<u>2</u>	<u>15</u>	<u>5</u>	<u>6</u>
Manufacturing	--	--	3	1	11	--	...
Nonmanufacturing	--	--	1	1	5	5	...
<u>Wage freeze</u>	<u>4</u>	<u>--</u>	<u>3</u>	<u>42</u>	<u>22</u>	<u>18</u>	<u>22</u>
Manufacturing	--	--	1	26	9	5	...
Nonmanufacturing	4	--	1	16	14	13	...

^{1/} These data, which are collected by the Bureau of Labor Statistics, refer to private sector collective bargaining agreements covering 1,000 or more workers. A separate survey (which includes non-union workers and salaried employees) conducted by the Federal Reserve Board (FRB) suggests that a considerably larger number of workers acceded to concessions during the period 1981-83. According to the FRB survey, 0.4 million workers were covered by concessions in 1981, 2.3 million in 1982, and 1.3 million in 1983 (the last year for which these data have been collected).

^{2/} Source: United States Department of Labor, Bureau of Labor Statistics.

As the period of economic stagnation lengthened and the dollar continued to strengthen, concessions spread across a broad segment of U.S. industry. In 1982, the number of workers covered by concessions rose to 1 1/2 million, or almost 45 percent of all workers covered by major collective bargaining agreements--a figure that is far in excess of the previous recorded high of 25 percent in 1963. It is noteworthy that the vast majority of concessions in 1982 took the form of wage freezes in the manufacturing sector, as many of the larger agreements (for example, in the automobile, trucking, and rubber industries) broke with traditional practice by eliminating guaranteed annual wage increases.

The total number of workers covered by concessions declined in 1983 to 1 1/4 million workers from 1 1/2 million the year before, but there was a sharp rise in the number of workers who received pay cuts. Almost 1/2 million workers accepted some form of wage reduction in 1983 compared with about 0.1 million in both 1981 and 1982 and virtually none in any other year since the 1950's. In 1983, the most significant wage declines (ranging from 10 to 20 percent) occurred in the steel, airline, and meat packing industries.

Despite continued recovery of the economy and a rise in profitability, pay cuts and freezes continued to be a prominent feature of wage negotiations in 1984 and the first quarter of 1985. Roughly one fourth of all workers who negotiated during this period agreed to concessions.

In addition to wage concessions, there have been several important innovations in collective bargaining agreements in recent years including two-tier pay systems, participation and gain-sharing agreements, and work rule changes. Under two-tier pay systems newly-hired workers--whose interests typically are not represented at the time such systems are negotiated--receive lower wages and benefits than members of the existing workforce.^{1/} In the case of participation arrangements, unions obtain a voice in management of the corporation; gain-sharing arrangements link worker compensation to the performance of the company.^{2/} Work rule changes have covered a broad range of modifications to traditional contractual rules that govern the performance of work; for example, these have included allowing management more flexibility in scheduling work, restricting the use of seniority in job assignment, and eliminating superfluous jobs.

^{1/} Extensive data on the frequency of two-tier pay plans do not exist. However, a survey by the Bureau of National Affairs found that 8 percent of nonconstruction contracts finalized in 1984 specified a dual pay plan compared with 5 percent in 1983. Such plans were prominent in agreements in the aerospace, airline, and retail food industries.

^{2/} The Bureau of National Affairs has reported that during the first half of 1983, about 5 percent of the concession contracts that it surveyed contained some form of profit-sharing or stock ownership scheme. Other estimates provided in Flanagan (1985), suggest that 8 to 10 percent of the workers in large bargaining units were covered by profit-sharing schemes in late 1983.

2. Factors influencing wage concessions

During the period 1981-84 when wage concessions were most widespread, U.S. corporations and organized labor were facing unusual economic circumstances: the U.S. economy passed through the longest recession of the postwar period before staging a sharp rebound in 1983-84; the U.S. dollar soared to new highs; deregulation of certain domestic industries opened markets to new competitive pressures; and the political climate became less favorable to unions.^{1/} In addition, by the early 1980s other longer-term structural factors resulted in pressures on unions to modify traditional wage formulas: the differential between union and nonunion wages had reached an all-time high; real wage increases for many union workers had tended to outstrip productivity gains; strike activity was near a postwar low (see middle panel of Chart 1); and union membership was on the decline (see lower panel of Chart 1).^{2/} In order to assess the relative importance of these various factors, it is useful to examine the industry composition of recent wage concessions.

As indicated in the tabulation below, the incidence of wage concessions has varied widely across industries.^{3/} Wage concessions were most prevalent in the construction industry where 40 percent of all contracts contained concessions. Agreements in the metals industry (mainly those involving the Steelworkers' and Auto Workers' Unions) and the retail food industry (involving the Food and Commercial Workers' Union and the Teamsters) also account for a substantial portion of all concessions. Similarly, wage cuts have been more concentrated in some industries than others. For example, although the manufacturing and airlines industries each accounted for less than 5 percent of all concessions, roughly one half of those concessions involved wage cuts. By contrast, only about one quarter of contracts signed in the construction, metals, and retail food industries contained wage cuts.

^{1/} It appears to be the consensus of literature on this topic that public policy changes (including recent appointments to the National Labor Relations Board) have been a relatively minor factor affecting concessions. The most dramatic development in this area was the firing of air-traffic controllers who were involved in an illegal dispute with the Federal Government.

^{2/} The number of wage and salary earners represented by labor organizations in the private sector dropped 2 1/2 million during the period 1980-84. Of these, almost 1/2 million were lost during 1983-84, a period when employment was generally rising. In this context, it is notable that unions maintained their representation among government employees, a group generally insulated from competition.

^{3/} These data, which cover settlements involving 50 or more workers, were compiled from a survey undertaken by the Bureau of National Affairs. It should be noted that the data refer to the number of contracts and not the number of workers covered by those contracts.

Union Concessions by Industry 1/

(In percent)

	1981-84	
	Contracts With Concessions Relative to All Contracts	Contracts with Wage Cuts Relative to Contracts With Concessions
Construction	40	28
Metals	10	22
Retail food	9	33
Machinery	6	11
Airlines	4	43
Lumber and paper	3	3
Meat packing	3	61
Printing and publishing	3	6
Aerospace	2	4
Motor vehicles and parts	2	4
Others	16	11

Three factors appear to have influenced the recent wave of wage concessions. First, in certain key manufacturing industries--metals, machinery, and motor vehicles--foreign suppliers made inroads into U.S. markets during the 1970s and the sharp rise in the U.S. dollar since mid-1980 has increased pressure on domestic producers. Second, in some industries--especially airlines--deregulation effectively removed barriers to entry and new low-cost nonunion firms have thrived. Finally, industries such as construction and lumber and paper were among the sectors most hard-hit by the stagnation in aggregate demand during 1980-82.

Many industries where concessions have been prominent also have experienced large increases in their labor costs over an extended period of time. For example, union wage scales in autos, steel, and rubber rose from some 30 to 40 percent above the average wage for all private nonfarm production workers in the late 1960s to 50 to 80 percent above the average in 1981. In many cases increases in productivity were not sufficient to offset rises in real wages, particularly in the period 1974-81 (see following tabulation).

1/ Source: Mitchell (March 1985).

Productivity and Real Wage Growth

(Percentage changes at annual rates)

	<u>Productivity Growth</u>		<u>Real Wage Growth</u>	
	<u>1947-73</u>	<u>1974-81</u>	<u>1947-73</u>	<u>1974-81</u>
Steel	1.8	0.8	2.6	2.3
Retail food stores	2.8 <u>1/</u>	-0.6	2.5 <u>1/</u>	0.8
Construction machinery	2.1 <u>1/</u>	0.1	2.1	0.7
Fabricated structural metals	2.3 <u>1/</u>	-0.4	3.7	0.2
Motor vehicles and equipment	3.7 <u>2/</u>	1.9	1.6 <u>1/</u>	1.4
Air transportation	7.5	2.6	...	...

3. The impact of concessions on wage inflation

The very large number of wage concessions during the period 1981-84 undoubtedly contributed to the recent sharp drop in wage inflation. (See the discussion of cost developments in Section II of the Recent Economic Developments paper). However, an important issue that arises in this context is the extent to which concessions reflected factors additional to the usual behavior of wages during periods of slack in labor markets. Insofar as these concessions and the wage deceleration during the period 1981-84 are explained solely by the severity of the 1981-82 recession, a continuing economic expansion might be expected to signal an end to concession bargaining.

Virtually all the empirical studies in the area have found that the recent wage deceleration exceeded what would have been predicted on the basis of historical macroeconomic relationships. Cagan and Fellner (1983) found a downward shift in the hourly earnings index after 1981 of around 1 percentage point while Gay's (1984) equations for hourly compensation overpredict by slightly more than 1 percentage point in 1983 and the first half of 1984. Perry (1983), using the average hourly earnings index, found no evidence of a downward shift before the fourth quarter of 1982 but acknowledged that evidence of a shift was accumulating by the second quarter of 1983. Gay also tested whether the dispersion of profit rates across manufacturing industries had contributed to the recent deceleration of wages; he concluded that institutional considerations and long-term factors (such as those noted above) played an important role in the downward shift in wage inflation. Thus, this empirical evidence generally supports the notion of a shift in macroeconomic wage-setting behavior that roughly corresponds with

Source: Gay (August 1984), Table 9.

1/ 1958-73.

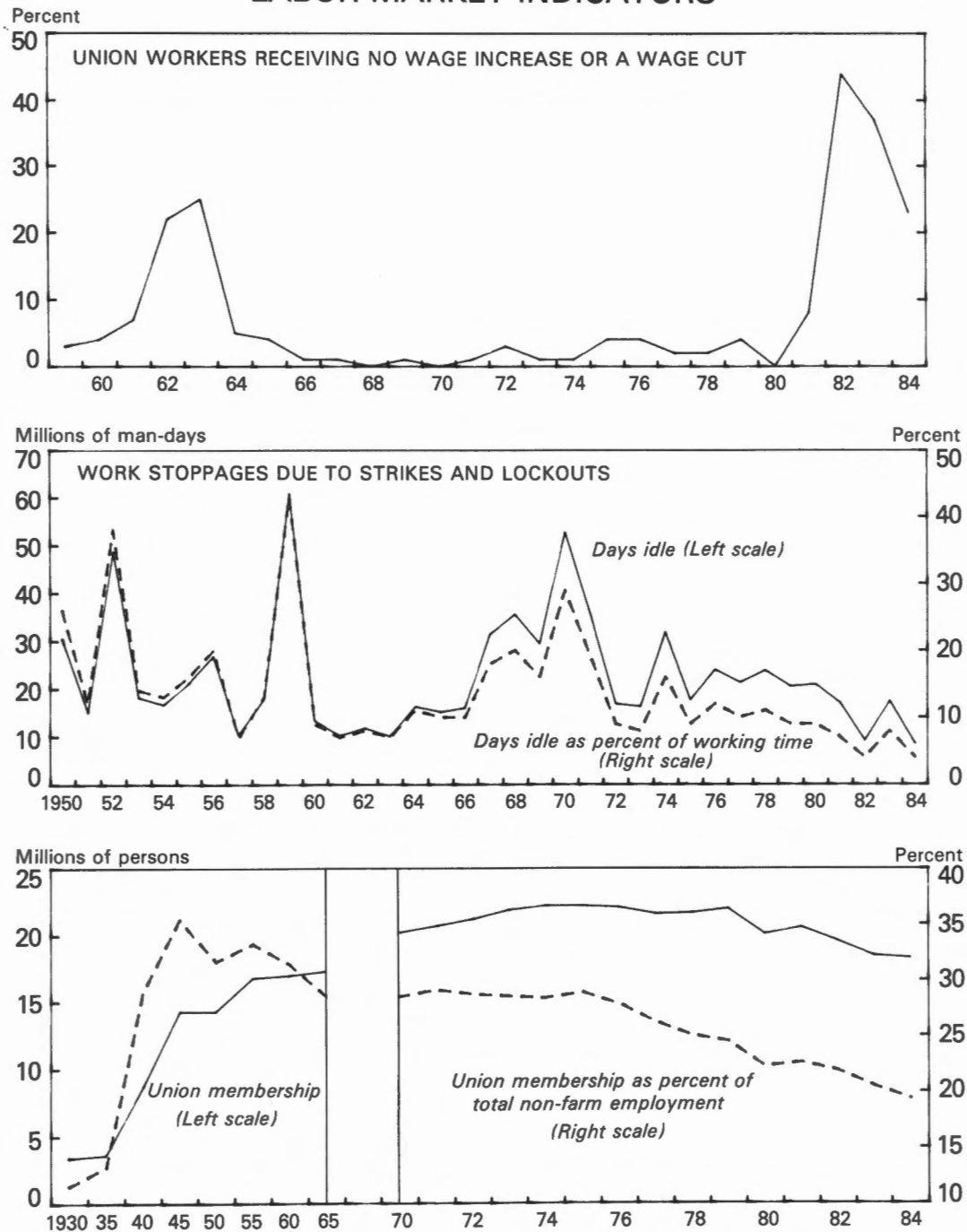
2/ 1957-73.

the period of most extensive wage concessions. The magnitude of this shift, which was spread over the period 1982-84, appears to represent approximately 1 1/2 percent of the average level of wages in the private sector.^{1/}

Several explanations have been advanced to account for this tendency of conventional wage equations to overpredict recent wage inflation. Some analysts have argued that the sustained anti-inflation stance of monetary policy after 1979 persuaded economic agents that inflation would be reduced substantially, thereby speeding up the transition to lower rates of price and wage inflation. Another explanation--which is supported by the empirical work of Gay--suggests that the overpredictions of wage inflation reflect the inability of conventional macroeconomic wage models to capture sector-specific financial strains and to take account of improvements in the operation of labor markets at the microeconomic level. Altogether, this evidence suggests that the prolonged period of slack demand during the 1981-82 recession, combined with heightened domestic and international competitive pressures, brought to a head long-run structural problems facing much of industry that was unionized.

^{1/} There is also some evidence (Mitchell, April 1985) that during the period of concessions, cost of living adjustment (COLA) clauses became less generous owing, for example, to stricter limits on the maximum adjustment that could be paid. Mitchell estimates that during 1980-82 the typical COLA payment implied an elasticity of roughly 0.65 with respect to inflation. In 1983-84, this elasticity fell to a little over 0.5. The effect of this development over the next few years will be to make wages respond less automatically to rises in inflation.

CHART 1
UNITED STATES
LABOR MARKET INDICATORS



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Energy

Gross energy consumption increased by 4 1/2 percent in 1984, following a period of falling energy demand that had begun in 1980. Domestic energy production, which had declined at an average annual rate of 1 3/4 percent in the three-year period ended in 1983, rose by 7 percent in 1984. In 1984 net imports of energy also grew by 7 percent and accounted for 12 percent of total consumption.

During the 1960s, the relative price of energy showed a tendency to decline and gross consumption of energy rose faster than real GNP (see tabulation below and upper panel of Chart 1). From 1973 to 1981 sharp increases in the relative price of energy contributed to a drop in energy consumption per unit of output. Although the relative price of energy has declined in recent years, energy consumption per unit of real GNP has continued to fall. This development reflects in part a continued increase in the energy efficiency of the capital stock associated with the price developments of the 1970s.

<u>Period</u>	<u>Consumption of Energy Per Unit of Real GNP</u>	<u>Relative Price of Energy</u>	
		<u>Consumer Prices 1/</u>	<u>Producer Prices 2/</u>
<u>(Percentage changes at annual rates)</u>			
1963-72	0.3	-1.4	-0.2
1973-78	-1.7	3.9	7.5
1979-81	-3.2	11.3	15.4
1982-84	-2.8	-3.7	-3.6
1982	-2.4	-4.9	-2.1
1983	-4.0	-2.7	-5.3
1984	-2.1	-3.5	-3.5

In 1984 gross energy consumption increased by 4 1/2 percent compared with growth of real GNP of 6 3/4 percent. The use of coal and nuclear power registered the most rapid increase in 1984. Coal consumption has risen rapidly since the early 1970s in part a result of a change in the relative price of alternative energy sources. From 1973 to 1984, the price of coal relative to oil fell by 33 percent whereas the price of gas relative to oil rose by 73 percent.^{3/}

^{1/} The ratio of the energy component of the CPI to the non-energy component of the index.

^{2/} The ratio of the producer price index for fuels and related products and power to the overall index.

^{3/} Prices represent the delivered costs of each energy source to steam-electric utility plants.

Consumption of petroleum products rose by 3 1/4 percent in 1984 after declining at an average yearly rate of 3 percent in the previous two years. The growth of petroleum use in 1984 was concentrated in the areas of distillate fuel oil and other petroleum products; 1/ consumption of these categories rose by 6 percent and 8 percent respectively. Motor gasoline consumption rose by only 1 percent and demand for residual fuel oil fell by almost 4 percent, a result of the continuing conversion of electric utility plants to other sources of energy, particularly coal.

Gross Consumption of Primary Sources of Energy 2/

<u>Period</u>	<u>Total</u>	<u>Petro- leum</u>	<u>Natural Gas</u>	<u>Coal</u>	<u>Hydro- Power</u>	<u>Nuclear Power</u>
<u>(Percentage changes at annual rates)</u>						
1963-72	4.3	4.6	5.2	2.0	4.9	...
1973-78	1.5	2.4	-2.1	1.8	1.1	...
1979-82	-2.4	-5.5	-1.9	2.8	3.4	0.7
1982	-4.3	-5.3	-8.1	-2.9	16.6	3.9
1983	-0.5	-0.6	-6.2	3.8	8.7	2.3
1984	4.6	3.2	3.9	8.0	-2.2	11.6
<u>(Percentage distribution)</u>						
1962	100.0	45.0	29.3	21.7	3.9	...
1972	100.0	46.0	31.7	17.4	4.1	0.8
1978	100.0	48.6	25.6	17.8	4.0	3.9
1982	100.0	42.9	25.8	22.1	4.9	4.2
1983	100.0	42.6	24.6	22.6	5.5	4.5
1984	100.0	42.1	24.5	23.3	5.1	4.8

Demand for energy increased by 8 percent in the industrial sector in 1984 reflecting the strong pickup in economic activity (see Table 1). In the residential and commercial sectors, energy demand rose by 1 3/4

1/ Distillate fuel oils are light fuel oils distilled during the refining process as opposed to residual fuel oils which remain after refining and are used mainly in electric power plants. Other petroleum products include pentanes, other hydrocarbons and alcohol, unfinished oil, gasoline blending components and all finished petroleum products except finished motor gasoline, distillate fuel oil, residual fuel oil and liquified petroleum gases.

2/ Based on BTU equivalent data. Petroleum includes crude oil, still gas, liquefied refinery gas, and natural gas liquids. Total energy includes geothermal power, electricity produced from wood and waste, and net imports of coke; in 1984 these amounted to 0.2 percent of gross consumption.

percent in 1984, following a fall in consumption of nearly 3 percent in the previous year. Net energy consumption by the transportation sector grew by just under 4 percent.

Domestic energy production increased during the second half of the 1970s, and reached a peak in 1980. Following three years of decline, production rebounded sharply in 1984, attaining a new historical peak. Oil production, which had declined steadily from a historical peak of 9.6 mbd in 1970 to 8.1 mbd in 1976, increased by 6 1/2 percent in the next seven years as output from Alaska's north slope rose steadily. In 1984, Alaskan production averaged 1.7 mbd, and total U.S. production averaged 8.8 mbd, about 1 percent higher than the previous year. By contrast, coal production rose by over 14 percent in 1984; the increase was related to a rebuilding of stocks that had been depleted in 1983. Nuclear power production also increased sharply in 1984 and now accounts for 5 1/2 percent of total domestic energy production. Hydroelectric power production fell in 1984 after two years of rapid growth.

Gross Production of Primary Sources of Energy 1/

<u>Period</u>	<u>Total</u>	<u>Crude Oil</u>	<u>Natural Gas Plant Liquids</u>	<u>Coal</u>	<u>Natural Gas</u>	<u>Hydro-electric Power</u>	<u>Nuclear Power</u>
<u>(Percentage changes at annual rates)</u>							
1970-75	0.1	-1.6	-0.3	0.8	-0.7	2.9	...
1976-80	1.6	0.6	-1.0	4.4	0.3	-1.7	7.6
1981-83	1.8	0.3	-1.0	-2.4	-5.7	6.9	5.6
1982	-0.8	0.8	-5.0	1.5	-7.3	18.6	3.6
1983	-4.2	0.5	-0.3	-7.5	-9.4	7.6	2.3
1984	7.1	1.1	8.4	14.2	7.4	-3.3	11.6
<u>(Percentage distribution)</u>							
1969	100.0	32.9	4.1	23.9	34.4	4.5	--
1975	100.0	29.6	4.0	25.0	32.8	5.3	3.2
1980	100.0	28.2	3.5	28.7	30.8	4.5	4.2
1982	100.0	28.7	3.4	29.1	28.6	5.1	4.9
1983	100.0	30.0	3.6	28.3	27.0	5.7	5.2
1984	100.0	28.4	3.6	30.0	27.1	5.2	5.4

1/ Based on BTU equivalent data. Crude oil includes lease condensate. Total energy includes geothermal power and electricity produced from wood, waste, and wind energy; in 1984 these amounted to 0.3 percent of gross production.

After rising at an average annual rate of more than 15 percent a year in the period 1973-81, the consumer price of energy slowed substantially in the following three years; it rose by an average of 1 percent a year in 1982-83 and by 1 percent in 1984. The producer price of energy, which had increased at an average annual rate of almost 22 percent from 1972 to 1981, declined by an average of 2 1/4 percent in 1982-83 and by a further 1 1/4 percent in 1984. The refiner acquisition cost of oil fell by 18 percent in 1982-83 and by a further 1 1/4 percent in 1984.^{1/} In 1984 the well-head price of natural gas rose by 1 1/2 percent and the price of coal by only 1/2 percent.^{2/}

Net imports of energy, which had declined as a proportion of total domestic energy consumption from 1977 to 1982, rebounded in the next two years. In 1984, net imports reached 12 percent of total consumption, 1 1/2 percentage points higher than in 1982, but still below the 13 percent level registered in 1981. Coal exports grew by nearly 5 percent in 1984 and imports of petroleum products grew by 8 percent in 1984 as net petroleum imports averaged 4 3/4 million barrels per day.

	<u>1962</u>	<u>1972</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
<u>(In quadrillions of BTUs)</u>						
<u>Total energy</u> ^{3/}						
Consumption	46.8	71.6	74.0	70.8	70.5	73.7
Production	43.9	62.8	64.4	63.9	61.2	65.5
Net imports	3.5	9.3	9.6	7.5	8.3	8.9
Net imports (as percent of consumption)	7.5	13.0	13.0	10.6	11.8	12.1
<u>(In billions of barrels)</u>						
<u>Petroleum</u>						
Consumption	3.8	6.0	5.9	5.6	5.6	5.7
Production	3.1	4.1	3.7	3.7	3.8	3.8
Net imports	0.7	1.6	2.0	1.6	1.6	1.6
Net imports (as percent of consumption)	18.9	26.7	33.8	28.6	28.6	28.1

^{1/} The refiner acquisition cost is the cost of oil to the refiner, including transportation costs and fees.

^{2/} Cost of coal delivered to steam-electric utility plants.

^{3/} The excess of consumption over production differs from the amount of net imports because of inventory changes and miscellaneous losses and gains. Petroleum includes crude oil, still gas, liquified refinery gas, and natural gas liquids.

Table 1. United States: Consumption of Energy and Major Determinants

	Averages							
	1964- 1973	1974- 1979	1980- 1984	1980	1981	1982	1983	1984
(Percentage changes at annual rates)								
Gross energy consumption	4.3	1.1	-1.3	-3.7	-2.6	-4.3	-0.5	4.6
Net energy consumption ^{1/}	3.7	0.5	-2.1	-5.2	-3.4	-5.0	-1.5	4.7
Residential/commercial	3.5	--	-1.9	-4.0	-3.5	0.7	-2.8	1.7
Industrial	3.1	--	-3.6	-7.1	-5.4	-11.2	-2.3	7.9
Transportation	4.9	1.6	-0.6	-3.8	-1.0	-2.2	0.4	3.8
Real GNP	4.2	2.8	2.1	-0.3	2.6	-2.1	3.3	6.8
Real personal disposable income	4.8	2.7	2.9	0.6	2.7	0.9	3.5	6.7
Industrial production	5.5	2.9	1.6	-3.6	2.6	-8.1	6.4	10.7
Ratio of energy prices to overall price indexes								
Producer price ^{2/}	-0.2	10.1	4.6	23.2	10.9	-2.1	-5.3	-3.5
Consumer price ^{3/}	-1.1	5.5	1.4	15.3	2.9	-4.9	-2.7	-3.5

Sources: U.S. Department of Energy; U.S. Department of Labor, Bureau of Labor Statistics; and U.S. Department of Commerce.

^{1/} The difference between gross and net consumption is accounted for mainly by electricity transmission losses and losses incurred in the conversion of fossil energy sources to electricity.

^{2/} The ratio of the producer price index for fuels and related products and power to the overall index.

^{3/} The ratio of the energy component of the CPI to the nonenergy component of the index.

CHART 1
UNITED STATES
ENERGY PRICES AND CONSUMPTION

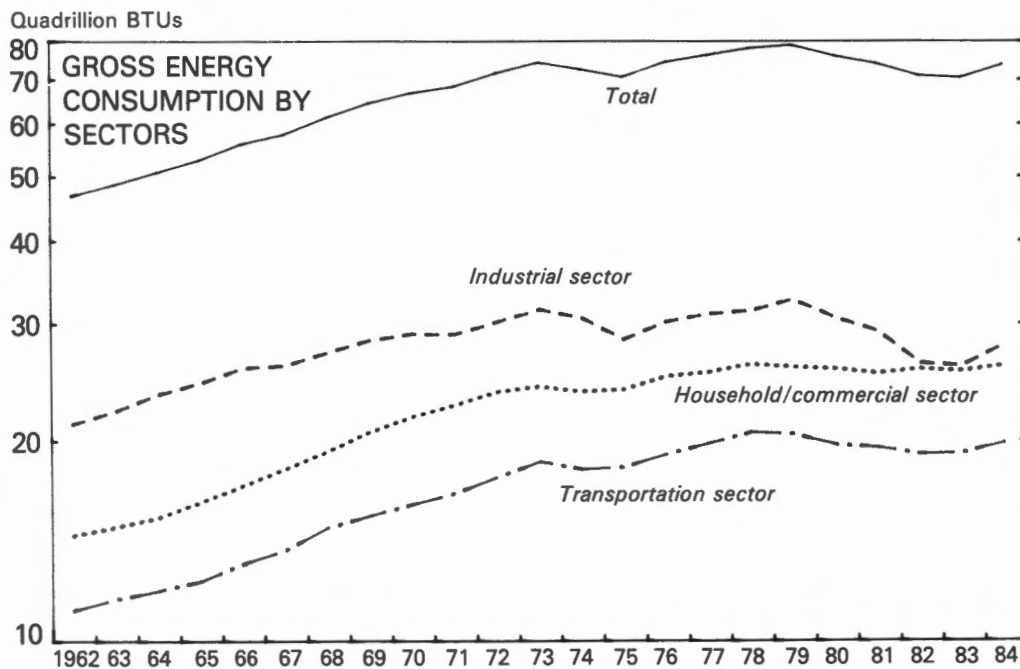
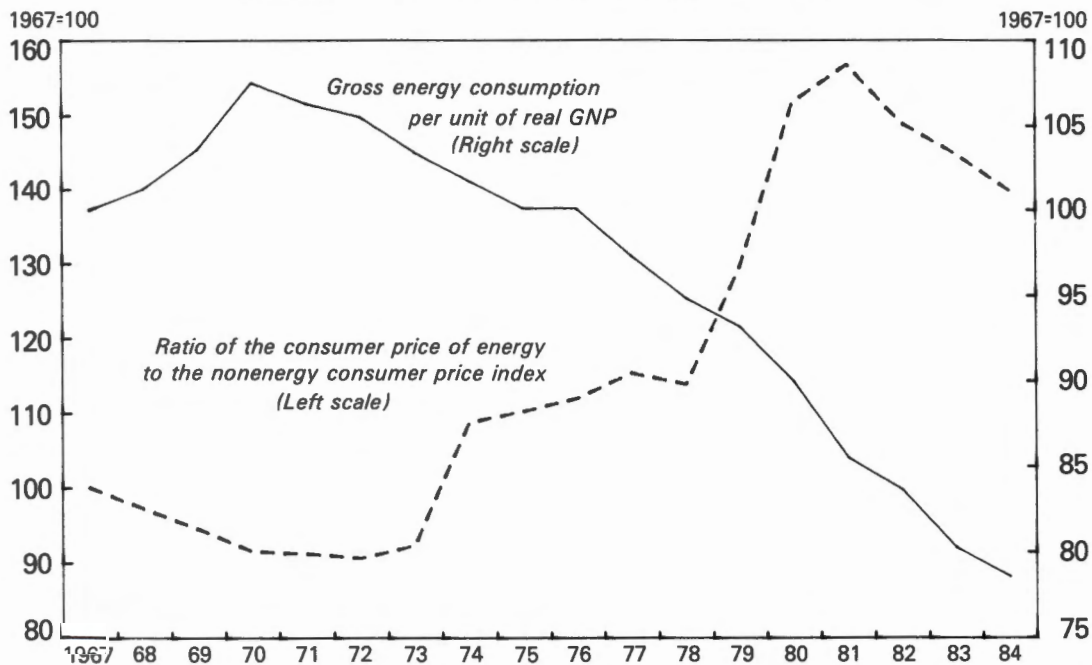
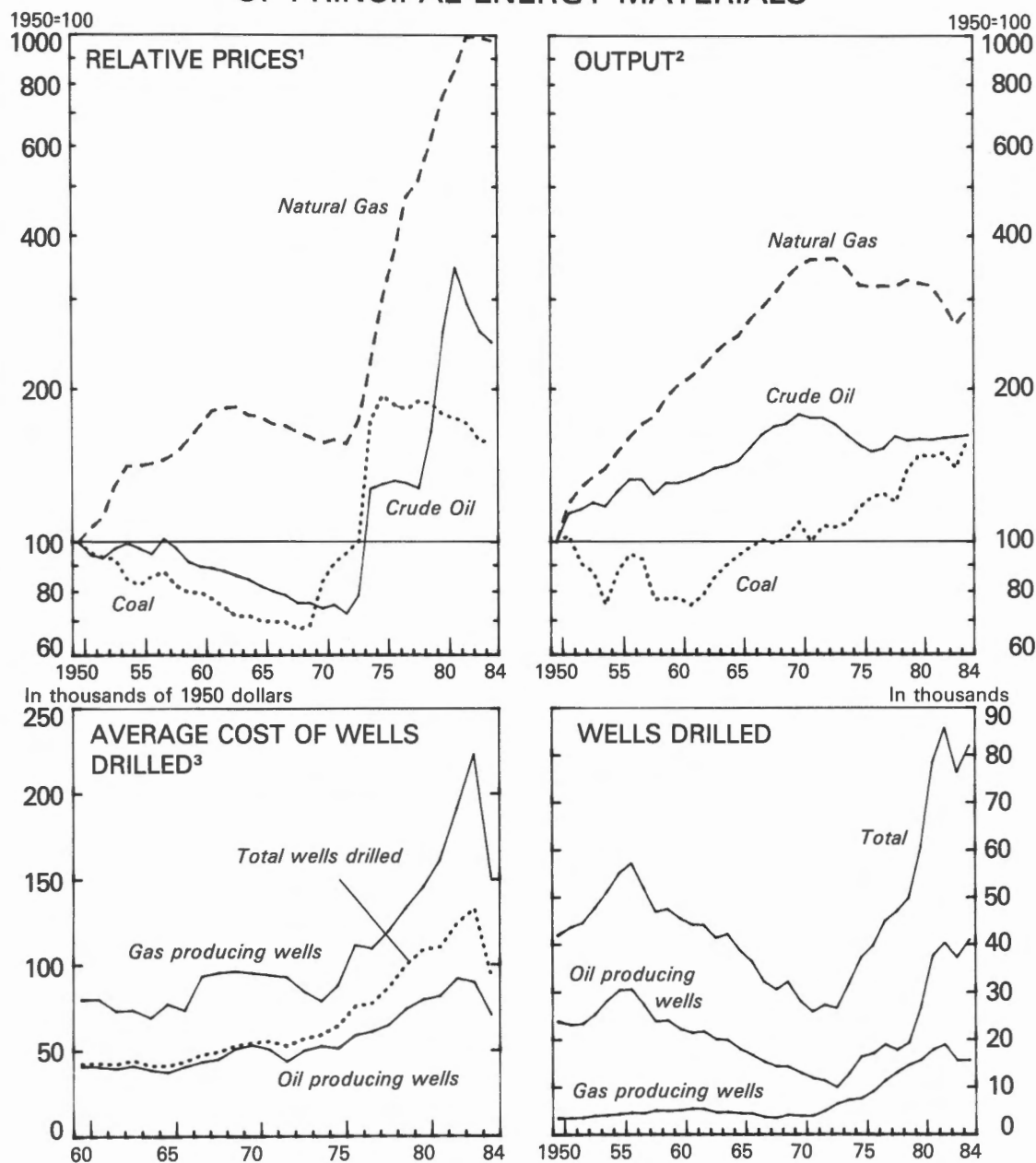


CHART 2
UNITED STATES
PRODUCTION AND PRICES
OF PRINCIPAL ENERGY MATERIALS



¹Crude petroleum and natural gas prices are average wellhead prices; coal prices are f.o.b. mine prices. All prices have been adjusted by the GNP price deflator.

²Product indices are based on data measured as follows: for coal, million short tons; for crude oil, million barrels; and for natural gas, billion cubic feet. Natural gas liquids are included with natural gas, and lease condensate with crude oil.

³Average cost per well, adjusted by the GNP price deflator.

Sources of Changes in U.S. Trade Flows

1. Introduction

Since 1980, there has been a substantial deterioration in the U.S. merchandise trade balance, with the deficit rising from \$25 billion in 1980 to \$108 billion in 1984. This increase in the deficit can be attributed mainly to differences in the performance of the U.S. economy relative to the rest of the world and to a significant loss in the price competitiveness of U.S. producers arising from the real appreciation of the dollar. To a lesser extent, the widening in the trade deficit also reflected the effects on U.S. exports of the debt servicing problems of some major developing countries (particularly in Latin America) and declining revenues of oil-exporting countries.

This appendix presents quantitative estimates of the impact of major factors that affected changes in U.S. exports and imports over the period from 1980 to 1984.^{1/} In Section 2, the effects of these factors on merchandise exports are examined. Section 3 discusses imports, and section 4 deals with the net impact on the trade balance. The analysis in this appendix is based on a set of annual equations for trade flows that are presented in Appendix VI.

2. U.S. exports

Estimates of the effects of changes in economic activity, relative prices, and other factors on U.S. exports are presented in Tables 1 and 2. Table 1 indicates that increasing export prices were the major factor behind the rise in the value of U.S. exports in 1980 and 1981.^{2/} Rising economic activity abroad was also important in explaining this increase, while the impact of changes in competitiveness and oil-exporting countries' purchasing power was smaller. In 1981, the external debt problems of non-oil developing countries began to reduce

^{1/} The results presented here update work that appeared in Appendix V of the 1984 United States recent economic developments paper (SM/84/178, Supplement 1). The methodology used to analyze changes in U.S. trade flows is described in that appendix. The results shown in this appendix differ from earlier ones because of revisions to data and re-estimation of the trade model.

^{2/} Changes in export prices affect only the value of exports. The effect on export volumes of changes in U.S. export prices relative to prices of export-competing goods is captured by the competitiveness variable.

U.S. exports.^{1/} In 1982 and 1983, exports declined sharply in value primarily reflecting the loss in the price competitiveness of U.S. producers stemming from the appreciation of the dollar. The rising debt burden of non-oil developing countries and the decline in purchasing power of oil-exporting countries also contributed to the reduction in exports during this period. In 1983, the negative impact of these factors on U.S. exports was partly offset by a pickup in economic activity abroad.

In 1984, U.S. exports increased for the first time in two years, largely reflecting continuing recovery of economic activity abroad. At the same time, the effect on the value of exports of a further loss in U.S. price competitiveness was more than offset by the effect of rising export prices. Declining real income of oil-exporting countries in 1984 had a smaller impact than in 1983, and the debt situation of non-oil developing countries eased somewhat, permitting an increase in U.S. exports to these countries. It should be noted that a significant portion of the change in exports in 1984 cannot be explained by the variables included in the equations. This unexplained portion primarily relates to an increase in nonagricultural exports to industrial countries. The strong rise in such exports in 1984 was concentrated in high technology goods (in particular, exports of computers and office machinery) and automobile parts to Canada for assembly and re-export to the United States.

3. U.S. imports

The value of U.S. imports rose sharply in 1980 reflecting a substantial increase in import prices (Table 3); over two thirds of the effect on imports of this increase resulted from rising oil prices. Imports rose further in 1981 owing to a real appreciation of the dollar, some pickup in U.S. economic activity, and an additional rise in import prices.^{2/} Over this two-year period, the impact of the lagged effects of past increases in the relative price of oil partly offset the rise

^{1/} It should be noted that the trade model significantly overpredicts the increase in U.S. exports (particularly nonagricultural exports to industrial countries) in 1981 (i.e., the residual item in Tables 1 and 2 has large negative values). This result may reflect some difficulty in picking up cyclical turning points in an annual model. In the second half of 1981, economic activity in major industrial countries began to decline, and U.S. exports to these countries fell. Likewise, the lagged effect on exports of the turnaround in the real value of the dollar that began in mid-1980 may not be adequately captured in an annual model.

^{2/} It is possible that the effect on imports of the pickup in economic activity in 1981 may be somewhat overstated because the impact of the cyclical downturn in U.S. GNP in the second half of 1981 may not be adequately captured using annual data. This would help to explain the model's overestimate of the change in nonpetroleum imports. The imposition of restraints on exports of Japanese automobiles to the United States in March 1981 also may have been a contributing factor.

in imports attributable to other factors. In 1982, U.S. imports registered a sizable drop as petroleum imports fell. The reduction in oil imports reflected continuing effects of past rises in the relative price of oil coupled with a decline in U.S. economic activity and a drop in petroleum prices. Nonpetroleum imports declined only slightly in 1982, as the impact of the recession in the United States and somewhat lower import prices were largely offset by a further rise in the real value of the dollar. The most important factors behind the increase in imports in 1983 were the strong rebound in U.S. economic activity and the additional deterioration in the competitive position of U.S. producers.

In 1984, nearly two thirds of the surge in imports was accounted for by the growth in the U.S. economy. Appreciation of the dollar in real terms continued to play a role in explaining the rise in imports; however, a major portion (25 percent) of the increase in imports—specifically nonpetroleum imports—is not explained by the variables in the equations. The increase in nonpetroleum imports in 1984 was broadly based, and special factors that may have affected particular import categories are not readily apparent. The adjustment efforts of debt burdened developing countries designed to increase export earnings and concerns that rising protectionist sentiments in the United States could lead to new trade restrictions may have contributed to the sharp overall increase in nonpetroleum imports.

4. The U.S. trade balance

Table 4 shows the net impact of developments in 1980-84 on the trade balance. The table indicates that the appreciation of the dollar and the relative cyclical position of the United States were the major factors explaining the deterioration in the trade balance since 1980. For the period 1981-84 as a whole, changes in price competitiveness and in the terms of trade of the United States (which were predominantly attributable to the rise in the value of the dollar) contributed some \$44 billion to the deterioration of the trade balance. Faster economic growth in the United States relative to other countries contributed some \$36 billion to the increase in the trade deficit. The debt problems of some non-oil developing countries and the declines in revenues of oil-exporting countries played a significant, albeit smaller, role in explaining the widening of the trade deficit. The lagged effects on the volume of petroleum imports of the sharp increase in oil prices in 1979-80 moderated the rise in the deficit.

Table 1. United States: Sources of Changes in U.S. Exports

(In billions of dollars)

Year	Actual Change	Effects of Changes in						
		Economic Activity 1/	OPEC Pur- chasing Power 1/	Debt Burden 1/	Compe- titive- ness 2/	Export Prices 3/	Exports to Eastern Europe	Re- sidual 4/
A. <u>Total Exports</u>								
1980	39.8	8.2	2.4	1.8	2.0	21.6	-1.8	5.5
1981	12.8	9.1	2.1	-4.8	4.9	18.2	0.3	-17.1
1982	-25.9	-0.3	-2.4	-7.9	-20.4	0.7	-0.7	5.2
1983	-10.5	7.4	-3.6	-2.0	-12.4	1.3	-0.8	-0.4
1984	19.6	13.5	-2.6	1.5	-4.9	6.2	1.4	4.5
B. <u>Agricultural Exports</u>								
1980	6.6	1.4	0.4	0.5	--	2.0	-1.6	4.0
1981	1.9	1.6	0.3	-1.4	--	2.0	0.3	-0.8
1982	-6.8	0.1	-0.4	-2.2	--	-4.4	-0.8	0.8
1983	-0.5	1.1	-0.5	-0.5	--	1.3	-0.5	-1.4
1984	1.7	2.2	-0.5	0.4	--	1.5	1.4	-3.3
C. <u>Nonagricultural Exports</u>								
1980	33.2	6.8	2.0	1.3	2.0	19.7	-0.1	1.5
1981	10.9	7.6	1.8	-3.5	4.9	16.3	--	-16.2
1982	-19.1	-0.4	-2.0	-5.7	-20.4	5.0	0.1	4.3
1983	-10.0	6.3	-3.2	-1.5	-12.4	--	-0.3	1.0
1984	17.9	11.3	-2.1	1.0	-4.9	4.7	--	7.8

1/ Effect on volume valued at current prices.

2/ Effect on the volume of exports of lagged changes in relative export prices adjusted for exchange rates, valued at current prices.

3/ Effect on the value of exports of changes in U.S. export prices.

4/ Represents the portion of the change in exports that is not explained; it is equal to the difference between the actual export change and the effects of changes in the explanatory factors shown.

Table 2. United States: Sources of Changes in
U.S. Exports by Country Group

(In billions of dollars)

Year	Actual Change	Economic Activity	Effects of Changes in					Re- sidual 4/
			OPEC Pur- chasing Power 1/	Debt Burden 1/	Compe- titive- ness 2/	Export Prices 3/		
A. <u>Industrial Countries</u>								
1980	21.2	2.8	--	--	1.4	13.6	3.5	
1981	4.8	4.6	--	--	3.3	11.2	-14.3	
1982	-14.7	-2.8	--	--	-13.3	0.6	0.9	
1983	0.2	5.7	--	--	-8.2	0.7	1.9	
1984	13.9	8.4	--	--	-3.3	4.0	4.9	
B. <u>OPEC Members</u>								
1980	2.8	--	2.4	--	--	1.7	-1.3	
1981	3.7	--	2.1	--	--	1.7	--	
1982	-0.4	--	-2.4	--	--	0.2	1.8	
1983	-5.5	--	-3.6	--	--	0.1	-2.0	
1984	-1.4	--	-2.6	--	--	0.4	0.8	
C. <u>Non-Oil Developing Countries</u>								
1980	17.5	5.5	--	1.8	0.6	6.3	3.3	
1981	4.0	4.5	--	-4.8	1.7	5.3	-2.7	
1982	-10.1	2.6	--	-7.9	-7.1	-0.2	2.5	
1983	-4.3	1.7	--	-2.0	-4.2	0.5	-0.3	
1984	5.7	5.1	--	1.5	-1.5	1.8	-1.1	

1/ Effect on volume valued at current prices.

2/ Effect on the volume of exports of lagged changes in relative export prices adjusted for exchange rates, valued at current prices.

3/ Effect on the value of exports of changes in U.S. export prices.

4/ Represents the portion of the change in exports that is not explained; it is equal to the difference between the actual export change and the effects of changes in the explanatory factors shown.

Table 3. United States: Sources of Changes in U.S. Imports

(In billions of dollars)

Year	Actual Change	Effects of Changes in				
		Economic Activity 1/	Compe- titive- ness 2/	Relative Price of Oil 1/	Import Prices 3/	Re- sidual 4/
A. <u>Total Imports</u>						
1980	37.7	-1.4	-4.0	-7.6	49.1	1.7
1981	15.3	14.3	12.2	-10.1	11.9	-13.0
1982	-17.4	-13.4	13.7	-6.4	-8.2	-3.1
1983	15.1	22.0	8.8	-1.8	-7.5	-6.3
1984	65.8	42.8	8.8	0.2	-2.4	16.4
B. <u>Petroleum Imports</u>						
1980	18.8	-0.3	--	-7.6	30.7	-4.0
1981	-1.5	3.2	--	-10.1	8.1	-2.7
1982	-16.5	-2.9	--	-6.4	-5.4	-1.9
1983	-7.2	4.3	--	-1.8	-5.5	-4.2
1984	3.4	7.0	--	0.2	-0.9	-2.9
C. <u>Nonpetroleum Imports</u>						
1980	19.0	-1.2	-4.0	--	18.4	5.7
1981	16.8	11.1	12.2	--	3.8	-10.3
1982	-0.9	-10.5	13.7	--	-2.8	-1.3
1983	22.3	17.7	8.8	--	-2.0	-2.2
1984	62.4	35.8	8.8	--	-1.6	19.4

1/ Effect on volume valued at current prices.

2/ Effect on the volume of nonpetroleum imports of current and lagged changes in relative import prices adjusted for exchange rates, valued at current prices.

3/ Effect on the value of imports of changes in U.S. import prices.

4/ Represents the portion of the change in imports that is not explained; it is equal to the difference between the actual import change and the effects of changes in the explanatory factors shown. It should be noted that the residual for petroleum imports includes the effects of changes in domestic petroleum production and stocks.

Table 4. United States: Sources of Changes in the U.S. Trade Balance
(In billions of dollars)

	1980	1981	1982	1983	1984	1981- 1984
<u>Total change in the trade balance</u>	<u>2.0</u>	<u>-2.5</u>	<u>-8.5</u>	<u>-25.6</u>	<u>-46.3</u>	<u>-82.8</u>
Effects of changes in:						
Economic activity <u>1/</u>	9.7	-5.2	13.2	-14.5	-29.3	-35.8
Purchasing power of oil-exporting countries <u>2/</u>	2.4	2.1	-2.4	-3.6	-2.6	-6.5
Competitiveness <u>3/</u>	6.0	-7.2	-34.1	-21.2	-13.7	-76.2
Relative price of oil <u>4/</u>	7.6	10.1	6.4	1.8	-0.2	18.1
Relative trade prices <u>5/</u>	-27.4	6.3	8.8	8.8	8.6	32.5
Debt burden of non-oil developing countries <u>6/</u>	1.7	-4.8	-7.9	-2.0	1.5	-13.2
Unexplained residual	2.0	-3.7	7.6	5.1	-10.6	-1.6

1/ Net effects of changes in U.S. real GNP on the volume of imports and changes in real foreign economic activity on the volume of U.S. exports, valued at current prices.

2/ Effects on the volume of U.S. exports of changes in the constant dollar export revenues of oil-exporting countries, valued at current prices.

3/ Net effects of changes in relative prices adjusted for exchange rates on the volume of exports and imports, valued at current prices.

4/ Effects on the volume of U.S. imports of changes in the real price of oil, valued at current prices.

5/ Net effects on the value of exports and imports of changes in export and import prices.

6/ Effects on the volume of U.S. exports of changes in the ratio of external debt to exports of goods and services for non-oil developing countries, valued at current prices.

Medium-Term Projections for the Current Account
of the U.S. Balance of Payments

In this appendix, a model of U.S. current account transactions is used to develop several scenarios for the external balance and the net international debt of the United States over the period from 1985 to 1990. These scenarios illustrate the effects on the current account balance and on the accumulation of foreign debt of various assumptions regarding the real value of the dollar. The sensitivity of these projections to changes in assumptions regarding domestic and foreign economic activity also is illustrated. Section 1 of the appendix explains the assumptions regarding key exogenous variables, and the medium-term projections for the U.S. current account balance are presented and discussed in Section 2. Section 3 describes the merchandise trade sector of the current account model, and Section 4 describes the services sector. Section 5 provides explanations of the variables used in the model.

1. Key assumptions

The assumptions for the key exogenous variables used in preparing the medium-term projections for the U.S. current account balance are shown in Table 1. Assumptions for U.S. and foreign economic activity and prices and U.S. interest rates for 1985 and 1986 are based on the current world economic outlook exercise. The assumptions regarding these variables over the period 1987-90 are based on the medium-term scenarios presented in World Economic Outlook, April 1985. The assumptions indicate a convergence in the growth rates of GNP in the United States and other major industrial countries in 1985-90. Activity in non-oil developing countries would grow faster than in industrial countries, as debt problems would ease over the period; continued slow growth in world petroleum demand would limit increases in the real purchasing power of oil-exporting countries. U.S. inflation is assumed to pick up somewhat over the projection period, while foreign export prices are assumed to rise at roughly constant rates. U.S. interest rates would decline slightly through 1988 before picking up in 1989-90.

Additional assumptions were made regarding major categories of capital flows in order to derive estimates for portfolio income receipts and payments. In the model, these income flows are derived by multiplying an average yield by the relevant stock of portfolio assets or liabilities (see Section 4 below). It is necessary to estimate portfolio income receipts and payments separately because the average yield is higher on U.S. assets than on U.S. liabilities.^{1/} Projected values for average yields were based on the assumption regarding U.S. interest rates since both U.S. assets and liabilities are predominantly

^{1/} The difference in the average yields on assets and liabilities arises because U.S. banks serve as international financial intermediaries and because a substantial portion of foreign holdings are invested in low yielding, basically risk-free U.S. Treasury securities.

denominated in dollars.^{1/} The stock of foreign portfolio assets held by U.S. private residents was projected on the basis of a judgement regarding trends in the underlying capital flow.^{2/} The stock of U.S. portfolio liabilities to foreigners was determined endogenously. Using the balance of payments identity, the change in portfolio liabilities was set equal to the sum (with sign reversed) of the current account balance, the assumed change in U.S. portfolio claims, and assumed levels of net direct investment flows, U.S. Government capital flows, and the statistical discrepancy in the U.S. balance of payments.^{3/} An explicit assumption was made for the statistical discrepancy in order to derive an estimate of the change in reported portfolio liabilities to foreigners; income payments (and receipts) in the U.S. balance of payments accounts are based only on reported capital flows. An iterative process was used in estimating portfolio income payments in order to account for the simultaneous relationship between such payments and the current account balance.^{4/}

The assumption regarding the statistical discrepancy also was used in calculating the net international debt of the United States. The published data on the U.S. international investment position are based only on recorded capital flows. In line with this treatment, the change in net foreign debt was calculated as the sum of the current account

^{1/} Changes in the average yields on portfolio assets and liabilities were assumed to be equal to the projected change in the three-month U.S. Treasury bill rate. This assumption implies that the differential in average yields does not change over the projection period.

^{2/} U.S. portfolio claims on foreigners increased by \$6.5 billion in 1984, compared with increases averaging more than \$70 billion in the preceding four years and \$30 billion during the period 1975-79. These outflows dropped sharply in 1983-84 reflecting concerns of U.S. banks about their foreign exposure and rising credit demands in the United States. It was assumed that U.S. portfolio claims would increase by \$5 billion in 1985 and that this outflow would rise to \$25 billion in 1989 and 1990.

^{3/} In 1984, net direct investment inflows were \$15 billion, and inflows of that magnitude were assumed to continue in the period 1985-90. U.S. Government capital flows include changes in U.S. official reserve assets and other U.S. Government assets. During the projection period, U.S. official reserve assets were assumed to be unchanged, and outflows of other U.S. Government assets were assumed to rise from \$5 1/2 billion in 1985 to \$6 1/2 billion in 1989 and 1990. Net inflows of \$30 billion per year were assumed for the statistical discrepancy, compared with an annual average of \$23 billion in the period 1980-84.

^{4/} In the first stage of this process, the current account balance was estimated assuming portfolio income payments were equal to their value in the preceding year. The stock of portfolio liabilities and an estimated value for the statistical discrepancy were then derived; portfolio income payments and a new current account balance were calculated. The process was repeated until the estimated value for the statistical discrepancy was equal to its assumed value.

balance and the statistical discrepancy, with the sign reversed. The level of indebtedness at the end of each period was derived by cumulating the changes in indebtedness from the small initial net asset position recorded at the end of 1984.

2. Current account scenarios

Table 2 presents projections for the U.S. current account balance and the net external debt of the United States in the period 1985-86 and four scenarios for the period 1987-90 based on alternative assumptions regarding changes in the real value of the dollar.^{1/} The current account deficit is projected to rise from \$102 billion in 1984 to \$125 billion in 1985 and to \$157 billion in 1986, assuming that the real value of the dollar remains constant at its level in the first quarter of 1985. The merchandise trade balance would continue to widen and net invisibles would fall, reaching near balance in 1986. With regard to the international investment position, the United States would shift from being a net international creditor of \$28 billion at the end of 1984 to being a net debtor of nearly \$200 billion by the end of 1986.

Scenario A in Table 2 is based on the assumption that during the period 1987-90, the real value of the dollar would remain unchanged at its level in the first quarter of 1985. In these circumstances, the U.S. current account deficit would rise from \$157 billion in 1986 to nearly \$275 billion in 1990. Two thirds of the deterioration in the balance on current account would reflect an increase in the trade deficit; with U.S. and foreign economic growth rates converging after 1987, a large part of this increase would be related to the sizable initial deficit position of the United States. The deterioration in the invisibles balance is accounted for by a decline in net investment income, reflecting rising interest payments on the growing U.S. external debt. Net international liabilities of the United States would increase steadily during the period, reaching nearly \$1 trillion by the end of 1990.^{2/}

^{1/} A roughly comparable medium-term projections exercise was published by Morgan Guaranty Trust Company in the March/April 1985 issue of World Financial Markets. The results derived by Morgan Guaranty are similar to those presented here.

^{2/} As noted above, the projections are based on assumptions and endogenously determined estimates of recorded capital flows. However, there is considerable reason to believe that the statistical discrepancy in the U.S. balance of payments primarily reflects unreported flows of capital (see Appendix VII, SM/84/178, Supplement 1). If the statistical discrepancy were treated as net unrecorded capital inflows and included in the change in portfolio liabilities, projected values for both the current account balance and net foreign debt would be significantly higher. In 1990, the current account deficit would be \$283 billion and net external debt would be nearly \$1.2 trillion at year-end.

Scenarios B, C, and D show the impact of a real depreciation of the dollar in 1987-90 on the current account balance and the net foreign debt of the United States. In Scenario B, the real value of the dollar is assumed to fall by 2 percent a year from 1987 to 1990. Under this assumption, the current account deficit would increase throughout the projection period, reaching roughly \$210 billion in 1990. The trade deficit would rise until 1987 and then would stabilize at around \$175 billion; the invisibles balance would deteriorate throughout the period. Net international debt of the United States would rise to \$850 billion. In contrast, if the real value of the dollar is assumed to decline by 5 percent a year after 1986 (Scenario C), the current account deficit would peak in 1987 at about \$175 billion and steadily decline thereafter to around \$90 billion in 1990. Improvement in the trade balance in 1987-90 would be partly offset by some deterioration in the balance on services and transfers. In this scenario, the United States would accumulate a net foreign debt of \$650 billion by the end of 1990.

To bring the current account back into balance by 1990, the model suggests that the real value of the dollar would have to depreciate by around 7 percent per year during 1987-90 (a cumulative real depreciation of 31 percent over the whole period). Under this assumption (illustrated in Scenario D) both the current account and trade deficits would peak in 1987 at \$175 billion. The current account would move to a small surplus in 1990, while the trade deficit would narrow to \$5 billion. The deterioration in net invisibles would end in 1987-88, and the balance on these transactions would shift back into surplus in 1989-90. The improvement in the invisibles balance over the period would reflect rising receipts from direct investment and a declining deficit on travel and transportation that would more than offset further increases in net portfolio income payments. The net international debt of the United States would rise to a little over \$500 billion in 1989 before declining in 1990.

Chart 1 shows the projections for the balance on current account transactions and the net international debt of the United States corresponding to the four scenarios presented in Table 2. The chart illustrates that changes in the assumption regarding the real value of the dollar have more than proportional effects on the current account balance and the external debt. The reason for this result is that the size and the growth in the net international liability position affect portfolio income payments and, in turn, the size of such payments affects the net accumulation of debt by foreigners.

Scenarios E and F in Table 2 provide an indication of the sensitivity of the current account projections to changes in assumptions about U.S. and foreign economic growth rates. If the real value of the dollar remained constant at its value in the first quarter of 1985 and U.S. GNP growth were 1 percentage point lower in each year from 1987 to 1990 than was assumed in Table 1, the current account deficit would increase from \$102 billion in 1984 to \$170 billion in 1987 and to \$200 billion in 1990 (Scenario E). Thus, lower U.S. growth would reduce the current

account deficit by more than \$10 billion in 1987 and by \$70 billion in 1990 compared with its levels in Scenario A. In Scenario F, the response of the current account balance to a 1 percentage point a year higher increase in the projected growth of foreign economic activity in 1987-90 is examined assuming a constant real value for the dollar. Under these assumptions, the current account deficit would widen to \$175 billion in 1987 and to \$235 billion in 1990. Compared with Scenario A, this deficit would be roughly \$5 billion lower in 1987 and \$35 billion lower in 1990. The difference in the impact of changes in the U.S. and foreign economic growth assumptions reflects higher estimated income elasticities for U.S. imports than for U.S. exports of goods and services.

3. The trade sector of the model

The trade sector of the current account model consists of five equations for U.S. exports, two equations for imports, and two equations for trade prices.^{1/} Separate equations were estimated for the volumes of agricultural and nonagricultural exports to industrial countries and non-oil developing countries, respectively. An equation also was estimated for the volume of total exports to members of OPEC. Exports to Eastern European countries are treated in the model as being determined exogenously. A single equation was estimated for the volume of U.S. nonpetroleum imports from all countries. Estimates for the volume of petroleum imports are derived from an equation for U.S. oil consumption and exogenous estimates of U.S. production of petroleum and changes in stocks.^{2/} Separate price equations were estimated for the deflators for nonagricultural exports and nonpetroleum imports. The deflators for agricultural exports and petroleum imports are exogenous.

In estimating the equations, export and import volumes were derived by using the relevant implicit price deflators for merchandise trade. Constant dollar estimates for agricultural and nonagricultural exports by country group were derived by using the respective deflators for total exports in each commodity category. The oil consumption equation was estimated using annual data for the period 1966 to 1984; all other export and import volume equations were based on annual data for the period 1974 to 1984. The price equations were estimated using annual data for 1972-84. The regression results are presented below. Capital letters refer to levels and lower case letters to natural logarithms; numbers in parentheses under the estimated coefficients are t-statistics. Definitions of variables in the equations are given in Section 5.

^{1/} This model is also used to derive the quantitative estimates of the effects of various factors on U.S. trade flows in 1980-84 presented in Appendix V.

^{2/} Changes in stocks include changes in the Strategic Petroleum Reserve. Additional adjustments are made to account for timing and definitional differences (primarily the inclusion of imports by Guam) between imports derived from the consumption, production, and stocks data and imports in the balance of payments statistics.

a. Equations for U.S. exports

(1) Agricultural exports:

To industrial countries

$$x_a^i = 2.17 + 1.49 y^i \quad (5.2)$$

$$\overline{R}^2 = 0.72 \quad D.W. = 0.89$$

To non-oil developing countries

$$x_a^d = 3.05 + 2.13 y^d - 0.88 b \quad (7.7) \quad (2.6)$$

$$\overline{R}^2 = 0.87 \quad D.W. = 1.58$$

(2) Nonagricultural exports:

To industrial countries

$$x_{na}^i = 3.77 + 1.72 y^i - 1.10 \pi_{-1}^x \quad (5.4) \quad (3.1)$$

$$\overline{R}^2 = 0.74 \quad D.W. = 1.58$$

To non-oil developing countries

$$x_{na}^d = 2.91 + 2.43 y^d - 1.28 \pi_{-1}^x - 0.64 b \quad (9.4) \quad (5.5) \quad (4.4)$$

$$R^2 = 0.95 \quad D.W. = 2.84 \quad RHO = 0.63 \quad (12.0)$$

(3) Total exports to members of OPEC

$$x_m^{OPEC} = 5.84 + 0.56 y_{-1}^{OPEC} \quad (4.7)$$

$$\overline{R}^2 = 0.68 \quad D.W. = 1.30$$

b. Equations for U.S. imports

(1) Nonpetroleum imports

$$m_{np} = -7.63 + 2.61 y^{US} - 0.35 \pi^m - 0.64 \pi^m_{-1}$$

(20.0) (1.7) (3.5)

$$R^2 = 0.99 \quad D.W. = 3.31$$

(2) Petroleum imports

$$M_p = C_{oil} - O_{prod} + O_{stk} + O_{dis}$$

$$C_{oil} = (1 + \dot{C}_{oil}) * C_{oil-1}$$

$$\dot{C}_{oil} = 0.77 \dot{Y}^{US} - 0.38 \sum_{i=0}^6 \alpha_i (\dot{C}_{oil})_{-i}$$

(4.7) (2.9)

$$\overline{R}^2 = 0.83 \quad D.W. = 1.79 \quad \rho = 0.71$$

(4.0)

Lag coefficients

i	0	1	2	3	4	5	6
α_i	-0.10	-0.08	-0.07	-0.05	-0.04	-0.03	-0.01

Lags on the relative price variable in the equation were estimated using a first-degree Almon polynomial with a zero end constraint.

c. Equations for U.S. export and import prices

(1) Deflator for nonagricultural exports

$$p_{na}^x = -0.61 + 0.73 p^{US} + 0.50 p_x^f$$

(10.0) (7.4)

$$\overline{R}^2 = 0.99 \quad D.W. = 1.08$$

(2) Deflator for nonpetroleum imports

$$p_{np}^m = 1.12 + 0.23 p^{US} + 0.69 p_m^f$$

(4.8) (12.4)

$$\overline{R}^2 = 0.97 \quad D.W. = 2.66 \quad RHO = 0.68$$

(14.6)

4. The services sector of the model

The services sector of the current account model consists of eight behavioral equations for major categories of services and two identities used to estimate portfolio income receipts and payments. Military transactions are treated as being exogenously determined. In this sector, separate equations for receipts and payments of travel and passenger fares, transportation, direct investment income, and other services were estimated using annual data for the period 1970-84.^{1/} Specifications of the equations in this sector of the model reflect both the nature of the type of transactions involved and the way in which they are estimated in the U.S. balance of payments accounts.

The equations for travel and passenger fare receipts and payments relate the volume of such transactions to economic activity and relative prices adjusted for changes in exchange rates. Volumes for these transactions are derived by deflating receipts by the implicit price deflator for U.S. GNP and payments by a weighted average of foreign consumer prices adjusted for exchange rates. The equations indicate that travel and passenger fare payments are responsive to changes in U.S. income and relative prices; receipts are responsive to changes in foreign incomes but are rather unresponsive to changes in relative prices.

Estimates for transportation receipts and payments in the balance of payments accounts basically are derived as the products of freight rates and average port expenditure costs times the volume of trade flows. Historically, movements in these transactions have largely reflected changes in trade flows. In line with this observed behavior, the equations for transportation relate changes in receipts and payments to changes in the constant dollar value of trade flows.

Direct investment income flows are specified in the model as being primarily determined by economic activity. The economic activity variables in these equations serve as proxies for the profitability of direct investments.^{2/} The effective value of the dollar is included in the equation for direct investment income receipts in order to capture the impact of changes in the value of the dollar on the translation of income earned in foreign currency.

^{1/} Other services include fees and royalties and miscellaneous services provided or purchased by U.S. residents or the U.S. Government.

^{2/} The equation for direct investment income receipts was specified in terms of the change in logarithms of the dependent and explanatory variables to take into consideration the effect on income receipts of the trend in U.S. direct investment abroad. A similar formulation of the equation for income payments on foreign direct investment in the United States and an alternative specification including a linear time trend did not produce satisfactory results.

In estimating equations for receipts and payments for other services, it was found that a simple autoregressive process adequately explained changes in these transactions. This specification implies that these services grow at a relatively steady rate over time.

Identities for portfolio income receipts and payments are used in the model instead of estimated equations. These identities are simplified versions of the identities actually used in the balance of payments accounts to calculate portfolio income flows.

The equations in the model and the key identities for portfolio income receipts and payments are presented below. As indicated above, capital letters refers to levels and lower case letters to natural logarithms; numbers in parenthesis under the estimated coefficients in the equations are t-statistics.

a. Equations for U.S. service receipts

(1) Travel and passenger fares

$$x_t = -9.55 + 1.92 y^1 - 0.38 \pi^t$$

(7.6) (1.6)

$$\overline{R^2} = 0.93 \quad D.W. = 0.84$$

(2) Transportation

$$\Delta x_f = 0.07 + 0.81 \Delta x_m$$

(6.2)

$$\overline{R^2} = 0.73 \quad D.W. = 2.41$$

(3) Other services

$$x_o = 0.20 + 0.95 x_{o-1}$$

(51.7)

$$\overline{R^2} = 0.99 \quad D.W. = 2.34$$

(4) Direct investment income

$$\Delta x_{di} = -0.11 + 6.31 \Delta y^1 - 1.02 \Delta e$$

(3.4) (1.7)

$$\overline{R^2} = 0.69 \quad D.W. = 1.73$$

b. Equations for U.S. service payments

(1) Travel and passenger fares

$$m_t = -13.90 + 1.36 y^{US} + 1.27 \pi^t$$

(12.5) (13.1)

$$\overline{R^2} = 0.93 \quad D.W. = 0.75$$

(2) Transportation

$$\Delta m_f = 0.05 + 0.91 \Delta x_m + 0.33 \Delta m_m$$

(6.4) (2.9)

$$\overline{R^2} = 0.79 \quad D.W. = 2.23$$

(3) Other services

$$m_o = 0.14 + 0.96 m_{o-1}$$

(27.1)

$$\overline{R^2} = 0.98 \quad D.W. = 1.71$$

(4) Direct investment income

$$m_{di} = -41.97 + 6.00 y^{US}$$

(10.2)

$$\overline{R^2} = 0.88 \quad D.W. = 1.60$$

c. Identities

(1) Portfolio income receipts

$$X_{pi} = I^a * A^{US}$$

(2) Portfolio income payments

$$M_{pi} = I^l * L^{US}$$

5. Definitions of variables

Definitions for the variables used in the trade and services equations are given below.

A^{US} = average U.S. private holdings of claims on foreigners and foreign securities.

B = ratio of long- and short-term external debt of non-oil developing countries to their exports of goods and services.

C_{oil} = volume of petroleum consumption in thousands of barrels per day.

- $\dot{C}_{oil}$ = percent change in the volume of U.S. oil consumption.
- E = index of the effective value of the dollar (MERM weights);
1980 = 100.
- I^a = average yield on U.S. private holdings of claims on
foreigners and foreign securities.
- I¹ = average yield on foreign holdings (including hold-
ings of foreign official agencies) of U.S. private liabili-
ties and of U.S. securities, including U.S. government
securities.
- L^{US} = average foreign (including official agencies) holdings of
U.S. private liabilities and U.S. securities, including
U.S. government securities.
- M_{di} = U.S. income payments on foreign direct investment in the
United States.
- M_f = U.S. payments for transportation services.
- M_m = total U.S. imports in constant 1972 dollars.
- M_{np} = U.S. nonpetroleum imports in constant 1972 dollars.
- M_O = U.S. payments for other services, including fees and royal-
ties and miscellaneous services purchased by U.S. private
residents and the U.S. Government.
- M_p = volume of petroleum imports in thousands of barrels per day.
- M_{pi} = U.S. portfolio income payments.
- M_t = U.S. payments for travel and passenger fares in constant
dollars.
- O_{dis} = the sum of timing and definitional differences between oil
imports derived from the consumption, production, and stocks
data and imports in the balance of payments statistics.
- O_{prod} = domestic petroleum production, in thousands of barrels per
day.
- O_{stk} = change in petroleum stocks, in thousands of barrels per day.
- P_m^f = weighted average of export prices of six major industrial
countries, adjusted for exchange rates.^{1/} Weights are based
on shares of these countries in U.S. nonpetroleum imports
in 1980.

^{1/} Canada, France, Germany, Italy, Japan, and the United Kingdom.

- p_x^f = weighted average of export prices of six major industrial countries, adjusted for exchange rates.^{1/} Weights are based on shares of these countries in U.S. nonagricultural exports in 1980.
- p^i = weighted average of the indexes for consumer prices in the industrial countries; weights are based on 1980 nominal GNPs for these countries.
- p_{US} = implicit price deflator for U.S. GNP.
- p_{na}^x = deflator for U.S. nonagricultural exports, 1972 = 100.
- p_{np}^m = deflator for U.S. nonpetroleum imports, 1972 = 100.
- π^m = relative price index for nonpetroleum imports, defined as the ratio of the price deflator for nonpetroleum imports to the implicit price deflator for U.S. GNP.
- π_{oil} = percent change in the relative price of oil; measured by the ratio of the producer price index for petroleum products to the implicit price deflator for GNP.
- π^t = relative price index for travel and passenger fares, defined as the ratio of the implicit price deflator for U.S. GNP to a weighted average of consumer prices of major industrial countries adjusted for exchange rate changes.
- π^x = relative price index for nonagricultural exports, defined as the ratio of the nonagricultural export deflator to the weighted average of export prices of six major industrial countries, adjusted for exchange rates.^{1/} Weights are based on shares of these countries in U.S. nonagricultural exports in 1980.
- x_a^d = U.S. agricultural exports to non-oil developing countries, in constant 1972 dollars.
- x_a^i = U.S. agricultural exports to industrial countries, in constant 1972 dollars.
- x_{di} = U.S. income receipts from direct investments abroad.
- x_f = U.S. receipts from transportation services.
- x_m = total U.S. merchandise exports in constant 1972 dollars.
- x_m^{OPEC} = total U.S. exports to OPEC members, in constant 1972 dollars.

^{1/} Canada, France, Germany, Italy, Japan, and the United Kingdom.

- $\dot{X}_{na}^d$ = U.S. nonagricultural exports to non-oil developing countries in constant 1972 dollars.
- $\dot{X}_{na}^i$ = U.S. nonagricultural exports to industrial countries in constant 1972 dollars.
- X_o = U.S. receipts from other services, including fees and royalties and miscellaneous services provided by U.S. private residents and the U.S. Government.
- X_{pi} = U.S. portfolio income receipts.
- X_t = U.S. receipts for travel and passenger fares in constant dollar.
- y^d = export-weighted average of regional indexes for constant dollar GNP of non-oil developing countries in the Western Hemisphere, Asia, and Africa.
- y^i = weighted average of indexes of constant dollar GNP for six major industrial countries, 1980 = 100.1/
- y_{OPEC} = proxy for purchasing power of oil-exporting countries; measured by export revenues deflated by the weighted average consumer price index for these countries,2/
- y_{US} = U.S. GNP in constant 1972 dollars.
- $\dot{y}_{US}$ = percent change in U.S. GNP in constant 1972 dollars.

1/ Canada, France, Germany, Italy, Japan, and the United Kingdom.

2/ Consumer price indexes are used as proxies for import prices, for which sufficiently long-time series are not available.

Table 1. United States: Assumptions for Key Exogenous Variables

(Percent change from preceding year)

	Actual			Average
	1984	1985	1986	1987-90
U.S. economy				
Real GNP	6.8	2.8	3.3	2.8
GNP deflator	3.8	3.8	3.8	4.2
Interest rates				
U.S. Treasury bills				
(90-day, percent)	9.6	7.8	7.6	7.6
Foreign economies				
Real GNP, industrial countries	4.0	3.4	2.7	2.9
Real GNP, non-oil developing countries	4.0	4.3	4.8	5.0
Real purchasing power of oil-exporting countries	-13.5	0.5	1.0	1.0
Export prices, industrial countries (local currency)	3.4	3.4	3.4	3.5
Other variables				
Unit value index for				
U.S. agricultural exports	4.2	-7.6	2.7	3.0
U.S. petroleum imports	-1.9	-5.0	-0.8	3.0

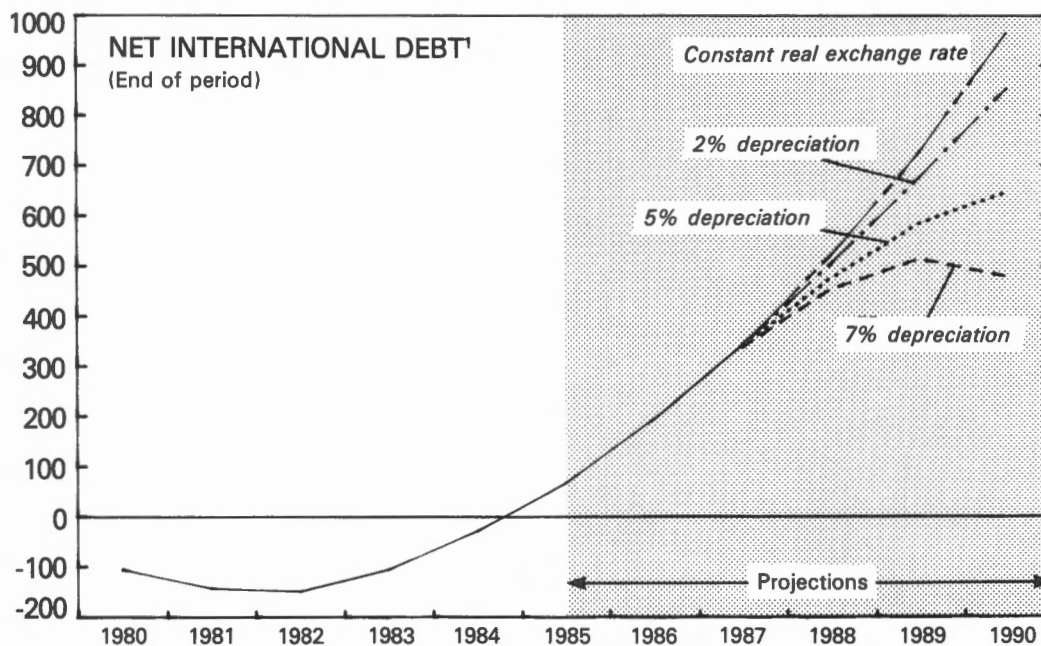
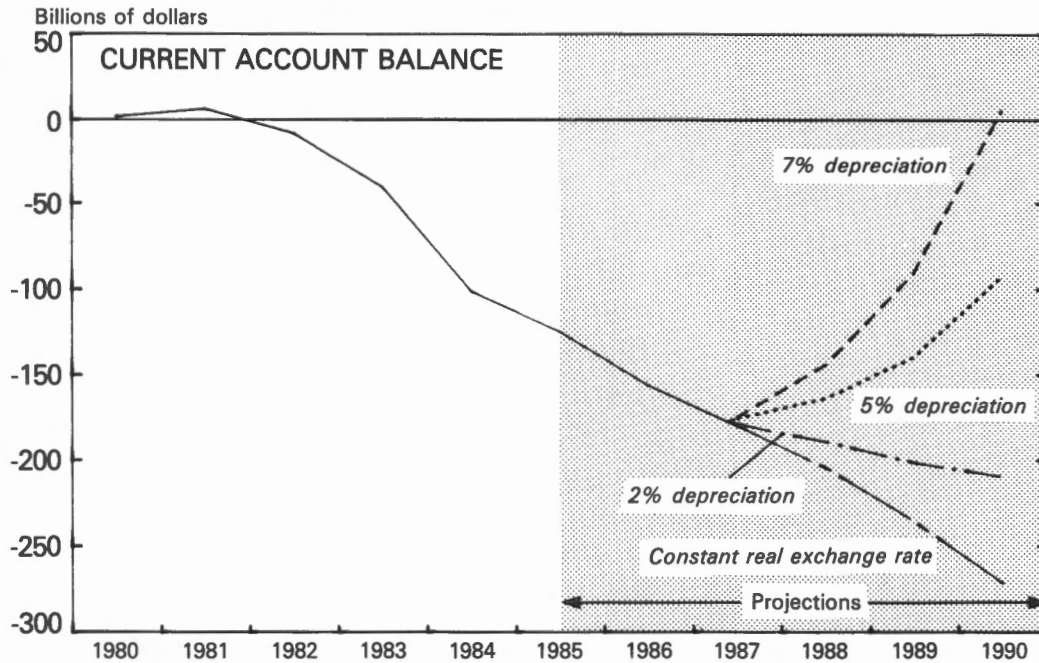
Table 2. United States: Medium-Term Scenarios for the U.S. Current Account Balance

(In billions of dollars)

	Actual 1984	1985	1986	1987	1988	1989	1990
<u>Scenario A: constant real value of the dollar</u>							
Current account balance	-101.5	-125.0	-156.8	-179.9	-204.4	-235.8	-271.5
Merchandise trade balance	-108.3	-128.9	-157.5	-173.0	-187.9	-204.9	-221.6
Invisibles, net	6.7	4.0	0.7	-6.9	-16.5	-30.9	-49.9
Investment income, net	19.1	14.6	11.0	3.5	-6.4	-20.7	-38.8
Net international debt 1/	-28.2	67.0	193.7	343.6	518.1	723.8	965.3
As a percent of: GNP	-0.8	1.7	4.6	7.7	10.8	14.1	17.5
Exports	-7.8	18.5	49.8	79.7	107.7	133.7	157.7
<u>Scenario B: 2 percent a year real depreciation of the dollar, 1987-90</u>							
Current account balance				-178.9	-189.3	-201.6	-209.6
Merchandise trade balance				-173.6	-176.9	-178.8	-174.3
Invisibles, net				-5.3	-12.4	-22.7	-35.4
Investment income, net				4.5	-3.6	-14.7	-27.5
Net international debt				342.6	501.9	673.5	853.1
As a percent of: GNP				7.6	10.5	13.1	15.4
Exports				78.5	100.3	116.3	126.4
<u>Scenario C: 5 percent a year real depreciation of the dollar, 1987-90</u>							
Current account balance				-176.5	-163.9	-139.5	-92.8
Merchandise trade balance				-173.7	-158.1	-130.6	-82.8
Invisibles, net				-2.8	-5.8	-9.0	-10.0
Investment income, net				6.2	1.0	-4.3	-7.0
Net international debt				340.2	474.1	583.6	646.4
As a percent of: GNP				7.6	9.9	11.4	11.7
Exports				76.3	89.0	90.4	81.7
<u>Scenario D: 7 percent a year real depreciation of the dollar, 1987-90</u>							
Current account balance				-174.7	-144.3	-90.3	5.0
Merchandise trade balance				-173.8	-143.4	-91.6	-4.9
Invisibles, net				-1.0	-1.0	1.3	9.9
Investment income, net				7.3	4.5	3.7	9.5
Net international debt				338.4	452.8	513.1	478.1
As a percent of: GNP				7.6	9.5	10.0	8.6
Exports				74.9	81.3	73.5	53.9
<u>Scenario E: constant real value of the dollar, 1 percent lower U.S. GNP growth 1987-90</u>							
Current account balance				-168.4	-178.1	-190.4	-201.5
Merchandise trade balance				-163.2	-166.5	-169.3	-168.7
Invisibles, net				-5.1	-11.6	-21.1	-32.8
Investment income, net				4.8	-2.7	-12.9	-24.7
Net international debt				332.1	480.2	640.5	812.0
As a percent of: GNP				7.5	10.2	12.8	15.3
Exports				77.1	99.8	118.3	132.7
<u>Scenario F: constant real value of the dollar, 1 percent higher foreign economic growth 1987-90</u>							
Current account balance				-174.9	-192.1	-213.4	-235.3
Merchandise trade balance				-168.5	-177.0	-185.7	-191.2
Invisibles, net				-6.4	-15.1	-27.8	-44.1
Investment income, net				3.6	-5.7	-18.7	-34.7
Net international debt				338.6	500.7	684.1	889.4
As a percent of: GNP				7.6	10.5	13.3	16.1
Exports				77.6	101.5	121.5	137.6

1/ A negative number indicates a net asset position.

CHART 1
UNITED STATES
MEDIUM-TERM PROJECTIONS FOR THE CURRENT ACCOUNT
OF THE U.S. BALANCE OF PAYMENTS



¹A negative number indicates a net asset position.

International Trade and Investment Policies

This appendix covers changes in the field of international trade and investment policies since the beginning of 1984. It is divided into five parts: (1) international agreements and trade law; (2) import policies and measures; (3) export policies and measures; (4) trade preferences for developing countries; and (5) other measures.

1. International agreements and trade law

On October 30, 1984, President Reagan signed into law the Trade and Tariff Act of 1984, an omnibus trade bill which had been approved by Congress on October 9, 1984. This act contained a wide range of provisions:

a. It extended the U.S. Generalized System of Preferences (GSP), which would have expired in January 1985, for a further eight and a half years, and made a number of alterations to the GSP which are discussed below.

b. It provided the President with authority to negotiate bilateral trade agreements aimed at harmonizing, reducing, or eliminating tariff and nontariff trade barriers. Specific authority was granted by the law to conduct such negotiations with Israel and Canada. Requests for authority to negotiate with other countries must be approved by the Senate Finance Committee and the House Ways and Means Committee. Any trade agreements negotiated under this authority would still be subject to congressional approval.

c. It provided presidential authority to negotiate bilateral and multilateral reductions in international barriers to trade in services and high technology products and in trade-distorting barriers to foreign direct investment. The law clarified the President's authority to retaliate against discriminatory foreign practices that affect U.S. trade in services and expanded his authority to act against unfair foreign practices in the area of direct investment.

d. A number of changes in existing trade laws were made that extended the reach of antidumping and countervailing duty laws and modified provisions in other trade laws. Major changes are:

(1) Industries would be eligible for countervailing duty protection in cases where imports are manufactured from subsidized materials or parts (referred to as "upstream subsidies").

(2) Antidumping and countervailing duty laws are extended to cover sales that are "likely" to take place. In general, previous laws applied only to sales that had already taken place and not those expected to occur.

(3) In determining material injury in cases involving dumping or subsidies, the International Trade Commission (ITC) is required to assess the cumulative impact of imports of similar products from all countries under investigation. This provision is designed to handle cases in which imports from individual countries account for only a small portion of total import penetration but may contribute to material injury to domestic industry when combined with similar imports from other countries under investigation. Previously, the ITC had applied this procedure on a discretionary basis.

(4) Guidance is provided to the ITC in its investigations of "substantial injury" to domestic industry by imports in escape clause cases. The ITC is instructed not to consider any one factor as overriding in determining whether to recommend import curbs; specifically, the profitability of the domestic industry is not to be taken as precluding a finding of injury by imports.

e. It provided the President with authority to enforce any steel export restraints negotiated as part of the "national policy for the steel industry" announced by the President on September 18, 1984, provided that profits from steel operations are reinvested in plant modernization and worker retraining.

f. Measures were established to deal with issues that have been raised by the U.S. wine industry. The Office of the U.S. Trade Representative is required to identify tariff and nontariff barriers to U.S. wine exports and to consult with other countries with a view to reducing such barriers. The President is empowered to retaliate against unfair foreign practices. In addition, the definition of the domestic wine industry for purposes of filing antidumping and countervailing duty complaints is modified for a two-year period to include growers of wine grapes.

On April 22, 1985, the Governments of the United States and of Israel signed the United States-Israel Free Trade Area Agreement, which was negotiated under the terms of the Trade and Tariff Act of 1984 and is the first such agreement entered into by the United States. Under the terms of this agreement, tariffs on all trade between the United States and Israel (worth \$3.7 billion in 1984) will be progressively reduced and will be eliminated by January 1995.^{1/} The Agreement also contains a number of measures designed to reduce nontariff trade barriers, including reductions in licensing restrictions and subsidies on industrial products, and greater access to government procurement procedures.

^{1/} Tariffs will be reduced in several stages, with different reduction schedules being established for different goods. In most cases, tariffs are to be eliminated by January 1989.

In 1984 and the first half of 1985, the United States signed bilateral subsidies agreements with six countries. Under the terms of the understandings, these countries have agreed to reduce or eliminate export subsidy programs. For its part, the United States has agreed to require that U.S. parties that allege unfair trade practices by these countries under U.S. countervailing duty statutes demonstrate that the imports in question cause or threaten to cause material injury to an established domestic industry.^{1/}

2. Import policies and measures

A chronology of major U.S. import restrictions on products of several important industries is provided in Chart 1. The chart shows that during most of the period 1969-84 some type of restraints has been applied to steel imports. In 1984, U.S. steel producers actively continued to seek protection. An escape clause petition covering all imports of carbon and alloy steel, excluding stainless and tool steel, was filed in January 1984. In June, the ITC found that imports of certain of these products were a substantial cause of injury to the domestic steel industry. It recommended to the President that tariffs be raised on a number of steel products and that quotas be imposed on others to limit volumes of imports to their respective shares of the U.S. market in the period 1979-81. In September, the President rejected the ITC's recommendations and announced an alternative program which sought to limit steel imports to 18 1/2 percent of U.S. consumption, compared with the 25 percent share of the market held by imports in the first half of 1984.

The President's program was designed to deal with the surge in steel imports during 1984 which the U.S. authorities largely attributed to subsidies and other trade-distorting practices of foreign governments. Under the program, voluntary export restraint agreements (VRAs) would be negotiated with major steel exporters to the United States, with the exception of the European Community (EC) (which had an existing VRA with the United States covering carbon steel) and Canada.^{2/} These VRAs would limit each exporter's share of the U.S. market and were intended to serve as an alternative to the imposition of countervailing and antidumping duties. Once the agreements were signed, the numerous dumping and subsidy complaints filed by the U.S. industry would be withdrawn. In addition, U.S. steel producers agreed not to file new complaints as long as the VRAs were in effect. The President's plan also called for continued rigorous enforcement of U.S. "unfair trade"

^{1/} This requirement that U.S. parties alleging unfair trading practices demonstrate material injury is generally applied when the imports in question come from a country that is a signatory of the GATT Subsidies Code.

^{2/} The United States reached an agreement regarding carbon steel imports from the EC in October 1982 (see SM/83/152, p. 80 for details). In exchange for limits on EC exports, U.S. producers withdrew anti-dumping and countervailing duty complaints against European producers.

laws (including self-initiation of unfair trade cases by the Commerce Department and the Office of the U.S. Trade Representative), discussions with U.S. trading partners to liberalize steel trade, and monitoring of the domestic industry's efforts to adjust.

In December 1984, it was announced that VRAs covering a five-year period from October 1984 to September 1989 had been negotiated with Australia, Brazil, Japan, Korea, Mexico, South Africa, and Spain. Subsequently, additional agreements were concluded with Czechoslovakia, Finland, and Poland.1/

As was noted above, the Trade and Tariff Act of 1984 provides the President with the authority to enforce the VRAs negotiated under the steel import relief program. The Act also contains a provision designed to encourage adjustment in the U.S. steel industry. Under this provision, U.S. companies are required to reinvest "substantially" all of their net cash flow from steel operations into the modernization of the industry and into maintaining competitiveness. In addition, they are required to commit at least 1 percent of their net cash flow to retraining displaced workers. The President must report to Congress annually that these requirements are being met; if they are not, the authority to enforce the VRAs will be terminated.

In December 1984, U.S. steel firms filed 28 antidumping and countervailing duty petitions against carbon steel imports from countries that did not have VRAs with the United States; some of these petitions were withdrawn later when VRAs were negotiated. In the first four and a half months of 1985, steel companies filed 16 more antidumping and countervailing duty actions. Steel pipe and tube imports from the EC were banned in November 1984 for the remainder of 1984 because such imports substantially exceeded the level specified in a 1982 letter of understanding between the United States and the EC. In January 1985, a revised arrangement was negotiated for 1985 and 1986, and the ban on pipe and tube imports was lifted.2/

1/ The market shares (or export limits) negotiated for each country are as follows: Australia, 0.18 percent; Brazil, 0.8 percent; Czechoslovakia, 40,000 tons; Finland, 0.22 percent; Japan, 5.8 percent; Korea, 1.9 percent; Mexico, 0.36 percent; Poland, 90,000 tons; Spain, 0.67 percent; and South Africa, 0.42 percent. Under the accord with the EC, carbon steel exports to the United States are limited to 5 1/2 percent of the market. The U.S.-EC agreement is scheduled to expire in December 1985 and the United States and the Community are currently negotiating an extension.

2/ Under the original letter of understanding, EC exports of steel pipe and tube to the United States were limited to 5.9 percent of the market. The EC market share will be limited to 7.6 percent under the new agreement.

In July 1984, the ITC concluded in an escape clause case that imports of nonrubber footwear were not a substantial cause of serious injury to the domestic industry. In December, a new escape clause petition was filed by the footwear industry, and the ITC issued an affirmative determination in May 1985. The ITC attributed the reversal of its earlier ruling to a significant deterioration in the position of the U.S. industry in 1984, as imports captured 71 percent of the U.S. market. In June, the ITC recommended that quotas be imposed on imports of nonrubber shoes for a five-year period.^{1/} The President has until September to decide whether or not to grant import relief to the shoe manufacturers.

Rapid growth in imports of textiles and apparel during 1984 led to further pressures by the domestic industry to tighten existing restrictions.^{2/} Such imports increased by roughly 35 percent in 1984, compared with a 5 percent rise in domestic shipments; in volume terms, import penetration was estimated to be about 30 percent. In response to complaints by domestic producers, interim regulations regarding the determination of the country of origin of textile and apparel imports were announced in August 1984. These regulations were designed to prevent foreign suppliers from circumventing relevant export restraint agreements by shipping parts of garments to other countries for superficial processing before the goods were finally shipped to the United States. The regulations became effective in September 1984; however, exceptions were made for goods that were ordered before the new rules were announced and that were imported before the end of October 1984.^{3/} In March

^{1/} The overall quota recommended by the ITC would limit shoe imports to 474 million pairs in the first two years, which would represent about 61 percent of the U.S. market for nonrubber footwear. Shoes with a customs value of less than \$2.50 would be exempt. The volume of shoe imports would be allowed to increase by 3 percent in the third year, by 6 percent in the fourth year, and by 9 percent in the fifth year.

^{2/} Since 1981, the Administration has established 300 separate quotas on textile and apparel imports from various countries. As of June 1985, approximately 80 percent of all imports from developing country suppliers are subject to quotas. Protection also is provided to the domestic industry by tariffs on textiles and apparel that average 22 1/4 percent compared with an average of less than 5 percent on products of other industries.

^{3/} These exceptions were granted in order to limit potential disruptions in supplies of goods that would affect sales during the Christmas season.

1985, final regulations were published, and they were implemented in April.^{1/}

The President announced in March 1985 that the United States would not ask Japan to extend existing restraints on exports of automobiles to the U.S. market beyond their scheduled termination at the end of that month. Subsequently, the Japanese Government decided to continue to restrict car shipments to the United States, but the limit on such exports in the year April 1985-March 1986 was raised by 24 percent to 2.3 million units from 1.85 million units in the preceding year and 1.68 million units a year in the first three years of the restraints.

The Japanese Government first imposed restraints on exports of automobiles to the United States in early 1981 in order to preempt more restrictive measures advocated by the U.S. auto industry. At that time, Japanese cars held a 22 percent share of the U.S. market, and U.S. producers were sustaining large losses. In 1984, Japan's share of the market slipped to 18 percent, and domestic manufacturers made record profits.

The results of a quantitative analysis prepared by the staff suggest that the restraints on exports of Japanese cars to the United States had substantial effects.^{2/} The average transactions prices for all new cars increased by nearly 50 percent over the period 1981-84,

^{1/} Under these regulations, when a product consists in whole or in part of materials originating in a third country, the country shipping the product to the United States is considered to be the country of origin if (i) the manufacturing or processing of the product in that country was substantial compared with the country in which the materials originated, and (ii) the manufacturing or processing in the country shipping the product to the United States was so substantial that the product could be considered new and different from the materials from which it was made. The criteria for determining whether substantial manufacturing has occurred include: the material, labor, and other direct processing or manufacturing costs; the time, complexity, and skill or technology involved; and the physical change in the product. The regulations provide that the necessary information needed to make a determination of origin must accompany the shipment of the product.

^{2/} The effects of Japan's restraints on automobile exports over the period 1981-84 were quantified using a simple model of the U.S. auto sector. This model was estimated using annual data for the period preceding the imposition of the quotas (1968-80); it was then used to predict values for prices, sales, and imports during 1981-84. The differences between actual values and the values predicted by the model provided an indication of the impact of the export restraints. Details of this model and of the estimated effects of the export restrictions presented below are contained in an unpublished paper prepared by the staff of the North American Division. This paper updates and extends the results presented in Appendix IX of SM/84/178, Supplement 1; it provides an analysis of both the overall impact of the quotas and their effects on U.S. and Japanese producers.

compared with an increase of 27 percent which would have been expected in the absence of the quotas. The higher prices resulted from a combination of pure price increases and shifts in the composition of car sales toward larger units with more extensively installed optional equipment. The restraints are estimated to have raised the average price of a new car by more than \$1,600 in 1984. Constant dollar expenditures on new cars during 1981-84 were reduced by 3 percent and sales by 4 million units as a result of the quotas, while the value of expenditures was raised by \$5 1/4 billion as increases in average transactions prices more than offset the effects of the restraints on volume sold. At the same time, the quotas served to increase the market share of the U.S. auto industry, and expenditures on U.S. cars were \$17 1/2 billion higher than they otherwise would have been; expenditures on Japanese autos were nearly \$15 billion lower.

In terms of the implications for consumer welfare, the rise in car prices (adjusted to exclude price increases due to changes in the quality of automobiles purchased) induced by the export restraints is estimated to have cost car purchasers nearly \$17 billion during the period 1981-84. Of this increase in purchasers' costs, \$6-12 billion represented a transfer to the U.S. automobile industry.^{1/} The remaining \$5-11 billion is largely accounted for by a transfer to foreign producers, and it can be considered to be a measure of the loss to the domestic economy as a whole stemming from the restraints on Japanese exports.

With regard to agricultural products, quotas on sugar imports were reduced by 17 percent in 1984 as part of the U.S. price support program for domestic sugar producers.^{2/} This action reflected weakness in sugar prices in the domestic market stemming from increased domestic production, rising use of sugar substitutes, and increasing imports of food products with high sugar content. In January 1985, import quotas were tightened further by extending the quota year by two months. Quotas also were placed on those import categories in which products were thought to have high sugar content (e.g., cake and cookie mixes), and duties were raised on syrups, molasses, and certain other sugar products. These actions were justified on the grounds that imports of these products were interfering with the functioning of the domestic sugar price support program.

In December 1984, a GATT panel ruled that preferential duties granted by the EC on imports of fresh lemons and oranges from certain

^{1/} A quality-adjusted price index is available for total passenger cars, but such series are not available for U.S. and imported cars separately. The ranges in the estimates of the transfers from domestic car purchasers to the U.S. and foreign auto industries reflect alternative assumptions regarding the pure price effects of restraints on domestic and imported cars.

^{2/} For a complete description of the price support program for sugar and a history of its implementation, see DM/85/26.

the GATT. The panel recommended that the EC reduce its most favored nation duty rates on lemons and oranges and that such a reduction be undertaken no later than October 1985. In June 1985, noting EC reluctance to accept the finding and recommendation of the GATT panel, the United States declared that the level of trade concessions between the United States and the EC was no longer in balance. To offset the adverse effects on U.S. exports of the EC preferential tariffs on citrus products, the United States announced an increase in duties on imports of pasta products from the EC. Pasta products were chosen as the means of obtaining compensation from the EC primarily because of an outstanding U.S. complaint that EC subsidies on exports of these products violated the GATT Subsidies Code and were injurious to U.S. manufacturers. In July, the United States agreed not to impose the additional duties on pasta imports, and in exchange, the EC agreed to reduce subsidies on its pasta exports to the United States. Further talks to try to resolve the U.S. complaint about EC preferential duties on citrus would be held in the fall.

In 1984, the ITC issued final determinations in three escape clause cases in addition to its rulings in the carbon steel and footwear cases discussed above. In ruling on petitions filed by stainless steel tableware manufacturers and tuna canners, the ITC found that these industries were not substantially injured by imports. The ITC issued an affirmative determination on a petition filed by the copper industry and recommended relief in the form of quotas or an increase in tariffs. However, in September, the President decided not to grant import relief.^{1/} In April 1985, a negative determination was made on a request for relief by manufacturers of potassium permanganate. With regard to escape clause actions in effect during 1984, relief was terminated for porcelain-on-steel cookware and clothespins. Currently, escape clause relief is in effect for motorcycles (due to expire in April 1988) and stainless and alloy tool steel (due to expire in July 1987).^{2/} As of June 1985, there were no escape clause actions pending.

In 1984, the Department of Commerce initiated 42 countervailing duty investigations, compared with 24 in 1983. Countervailing duties were imposed on 14 products during 1984 after final affirmative determinations were made. In 12 other cases investigations were terminated either when subsidies were not found or the domestic industry was found not to have suffered material injury from imports. Three cases were suspended, 12 investigations were terminated when petitions were

^{1/} The Trade and Tariff Act of 1984 contains a "sense of Congress" resolution calling on the President to negotiate voluntary restraint agreements that would reduce the output of major copper-producing countries for a three- to five-year period. The President is not legally bound by this provision to negotiate such arrangements and no such action has been taken by the U.S. Government.

^{2/} For details on the import relief granted in the motorcycle case, see SM/83/152, p. 82; for details on relief in the stainless steel case, see SM/84/178, Supplement 1, p. 55.

suspended, 12 investigations were terminated when petitions were withdrawn, and 2 petitions were dismissed.^{1/} In addition, countervailing duties on 7 products were revoked during 1984. In the first four and a half months of 1985, 14 countervailing duty petitions were filed. Final decisions have been reached and duties imposed in 7 cases. As of mid-May, 26 investigations were pending.

The Commerce Department initiated 48 antidumping investigations in 1984, compared with 43 in 1983. Affirmative determinations were made and antidumping duties imposed on 22 products. Negative determinations were reached in 19 cases; 9 petitions were withdrawn and 2 dismissed.^{2/} Antidumping duty orders were revoked in 11 cases during 1984. In the first four and one half months of 1985, 24 antidumping petitions were filed, and 10 final determinations (9 affirmative, 1 negative) were issued. As of mid-May, 56 investigations were pending.

In 1984, 27 petitions were filed alleging unfair import practices (principally involving infringements on patent rights), compared with 45 petitions in 1983. The ITC approved settlement agreements in 4 cases and issued exclusion orders in 16 others. In 1985, the ITC has initiated 11 new investigations; 50 cases are pending as of mid-May. Two new petitions alleging unfair foreign trade practices involving fertilizer and aerospace equipment were filed against the EC in 1984. In July 1985, a petition was filed against Japanese trade practices by U.S. semiconductor manufacturers.

3. Export policies and measures

During FY 1984 (ended September 1984), the Export-Import Bank of the United States (Eximbank) authorized direct credits amounting to \$1.5 billion, a substantial increase from the FY 1983 level of \$845 million; guarantees and insurance provided by Eximbank declined from \$8.5 billion in FY 1983 to \$7.2 billion in FY 1984. This shift away from credit guarantees toward direct credit reflected the improvement in creditworthiness of several large developing countries. For example, the perception of improved creditworthiness of Brazil and Mexico obviated the need to renew special credit guarantee and insurance facilities authorized in FY 1983 to maintain access of these countries to export credits from commercial sources. For FY 1985, Eximbank's program authority continued at FY 1984 levels of \$3.8 billion in direct credits and \$10 billion in guarantees and insurance.

In FY 1984, Eximbank established a tied aid credit program (as mandated in the renewal of the bank's charter in 1983). Under this program,

^{1/} Petitions were withdrawn in 7 cases after the Mexican Government announced restrictions on exports of various carbon steel products to the United States.

^{2/} Five petitions were withdrawn after South Africa imposed restrictions on its exports of carbon steel products to the United States; one petition against steel imports from Mexico also was withdrawn after Mexico announced export restraints.

Eximbank offered eight tied aid credits in FY 1984 and has offered three such credits thus far in FY 1985. On April 12, 1985, OECD ministers reached agreement on a new set of guidelines for tied aid credits. These guidelines provide for greater discipline and transparency in the use of tied aid credits. Under the new guidelines, the minimum grant element in such credits is raised from 20 percent to 25 percent, while countries are required to provide a twenty working-day prior notification of each tied aid credit offer with a grant element of less than fifty percent.

The blended credit program, established in FY 1983, offers agricultural exporters a combination of government-guaranteed commercial credits and interest-free loans from the Commodity Credit Corporation (CCC). In FY 1984, the program provided \$444 million of direct credits under a 6:1 ratio of guarantees to direct credits. In FY 1985, authorizations for such credit have totaled \$536 million, with a 4:1 ratio of guarantees to direct credits.

On May 15, 1985, the U.S. Department of Agriculture announced a three-year farm export enhancement program to subsidize agricultural exports by providing in-kind bonus payments of commodities held by the CCC to exporters; stocks worth up to \$2 billion would be made available for such subsidies. This program is designed to enable U.S. exporters to regain markets lost to "unfair foreign competition". The program will be targeted toward specific markets, particularly those where imports from third countries are subsidized. To date, offers under this program have been made to subsidize exports to Algeria and Egypt.

4. Trade preferences for developing countries

The U.S. Generalized System of Preferences (GSP), authorized by Congress under the Trade Act of 1974, provides duty-free access to the U.S. market to over 3,000 products from 140 countries. Preferential treatment under the GSP affected \$13 billion worth of imports in 1984, compared with \$10.8 billion in 1983. The GSP was extended for eight and a half years by the Trade and Tariff Act of 1984, and is now scheduled to expire in mid-1993. The new law also provides the President with broader authority to increase or reduce the duty-free treatment of eligible countries and provides for the gradual phasing out of benefits over a two-year period when a country's annual GNP per capita reaches a level initially set at \$8,500.^{1/}

In February 1985, it was announced that a general review of the GSP program would take place, as mandated by the new trade act. Under the general review, the President must review the competitive needs limits for all beneficiary countries; where a beneficiary country is determined to have demonstrated a sufficient degree of competitiveness, the

^{1/} This trigger level is to be increased each year by one half of the percentage change in U.S. GNP.

competitive needs limit will be lowered.^{1/} In making these determinations, the President will take a number of factors into account, including the level of development of the countries concerned, the openness of their markets to U.S. goods, services, and investment, and the degree of protection they afford intellectual property. In April 1985, the President announced that 32 countries would be designated as least-developed beneficiary developing countries and would be exempt from competitive needs limits.

Following the 1984 Annual Product Review, completed in April 1985, a total of \$13.7 billion of imports was excluded from GSP under the competitive needs provisions, compared with \$10.7 billion in the previous year. Imports of 185 products valued at \$251 million were ruled eligible for GSP under the de minimis waiver,^{2/} substantially more than the \$52 million ruled eligible under this provision in the previous year. The review also added four new items (worth \$41 million in 1984) to the list of GSP-eligible products and deleted one item (trifluralin) in response to a petition filed by a U.S. producer. In addition, a group of products was removed from the list of GSP-eligible items for four specific countries (worth \$163 million) in response to petitions filed by individual producers under the graduation policy.^{3/} The review also considered a range of products that had previously been excluded from the GSP by the competitive needs limitation but had become eligible for inclusion; imports worth \$246 million in 1984 were accepted into the program, while imports worth \$1.8 billion remained excluded under the graduation policy. In total, the review applied the policy of graduation to \$2 billion worth of imports (compared with \$1.2 billion in the 1983 annual review).

In March 1985, the Bahamas was designated as a beneficiary of the Caribbean Basin Economic Recovery Act; 20 countries had previously been designated as beneficiaries under the Act.^{4/} In 1984, U.S. imports of items eligible for duty-free treatment under the provisions of the Act were worth \$3.8 billion, an increase of almost 20 percent in relation to 1983. According to estimates of the U.S. Department of Commerce,

^{1/} Under the competitive needs provisions, a country loses GSP duty-free treatment for a product if shipments of the product in the preceding calendar year were at least 50 percent of total U.S. imports of the product, or more than a given dollar value (set at \$63.8 million in 1984).

^{2/} The de minimis provision gives the President authority to waive the 50 percent limit under the competitive needs provisions in cases where total U.S. imports of a product are below a certain value (\$7.6 million in 1984 compared with \$1.4 million in 1983).

^{3/} Under the graduation policy announced in 1981, GSP eligibility is denied to certain products from the most advanced developing countries that would be technically eligible for duty-free access to U.S. markets; the stated aim of this policy is to expand GSP opportunities for less competitive developing countries.

^{4/} The provisions of the Act are described in SM/84/178, Supplement 1, p. 61.

\$154 million has been invested in new export-oriented businesses in beneficiary countries since January 1, 1984.

5. Other measures

On May 1, 1985, the President exercised his statutory authority to declare a national emergency under the International Emergency Economic Powers Act and declared a prohibition on all trade between the United States and Nicaragua, to be effective from May 7, 1985. The prohibition also served to exclude Nicaraguan air carriers and vessels of Nicaraguan registry from entering into the United States.

In March 1984 and in March 1985 the President acted under the International Emergency Economic Powers Act to make further extensions to the export controls and anti-boycott provisions of the Export Administration Act of 1979, pending a renewal of the act.^{1/} In June 1985, a bill renewing the Export Administration Act was passed by Congress; it was signed by the President in July. On September 11, 1984, rules governing exports of high technology goods to the U.S.S.R. were amended to establish an extensive prelicense review process. On September 28, 1984, export controls applying to Iran were expanded to include all aircraft, helicopters, and related parts and equipment; previously such controls applied only to sales of aircraft worth more than a certain value and to helicopters above a certain weight.

In June 1984, the U.S. Congress passed a tax bill which included a provision to repeal the 30 percent withholding tax on interest paid to foreign holders of U.S. securities. Subsequently, the Internal Revenue Service established regulations to allow U.S. corporations to issue bearer bonds to foreigners and provided guidelines to U.S. firms to ensure that their bearer obligations were not purchased by U.S. citizens. The U.S. Treasury announced that it would not itself issue bearer bonds per se, but would sell a specially registered government bond designed to attract foreign investors by nondisclosure of the beneficial owners of the obligations. The tax bill also replaced regulations governing Domestic International Sales Corporations by new regulations under which U.S. exporters can attain tax relief by establishing a Foreign Sales Corporation which would be required to maintain an office overseas and practice arms-length pricing with its parent company.^{2/}

During 1984 the United States signed a Bilateral Investment Treaty (BIT) with Zaire and reached ad referendum agreements with Cameroon and Morocco; previously the United States has signed treaties with four countries.^{3/} Bilateral discussion on investment issues, including negotiations for BITs, continued with a substantial number of countries.

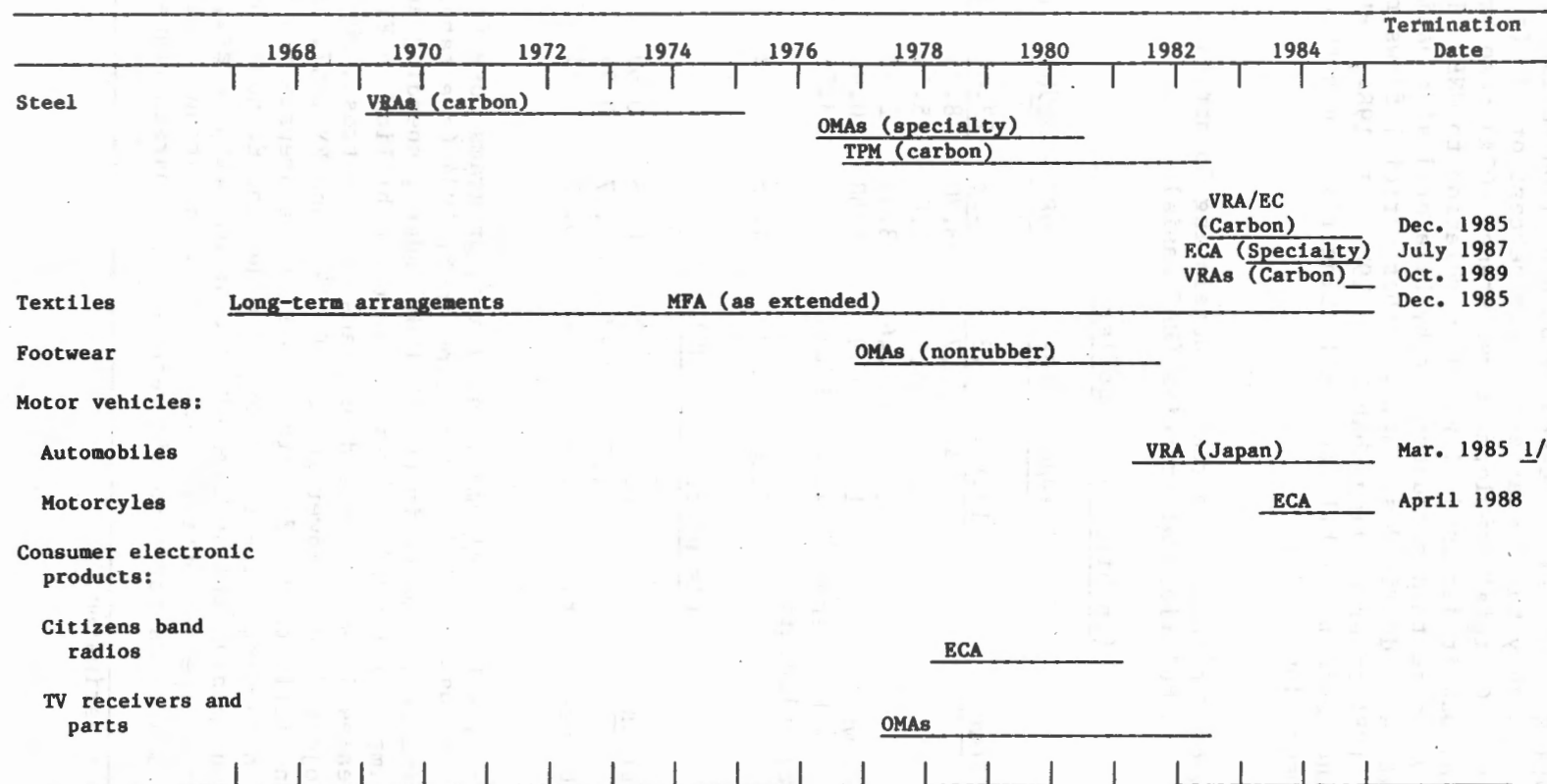
^{1/} For a description of these controls see SM/84/178, Supplement 1, pp. 61-62.

^{2/} See SM/84/178, Supplement 1, p. 63.

^{3/} See SM/84/178, Supplement 1, p. 61.

Chart 1

United States: Import Restrictions on Selected Industries, 1967-84



Key: ECA - Escape clause action
MFA - Multifiber arrangement
OMA - Orderly marketing arrangement
TPM - Trigger price mechanism
VRA - Voluntary export restraint agreement.

1/ In March 1985 the U.S. Government asked the Japanese Government not to extend the VRA on automobiles beyond its scheduled termination at the end of that month. Subsequently, Japanese authorities decided to continue export restraints.

Official Development Assistance

Preliminary data indicate that the total flow of financial resources (Development Assistance Committee (DAC) basis) from the United States to developing countries increased by \$5.6 billion in 1984 to \$28.6 billion, or roughly three quarters of one percent of GNP (see following tabulation). Official development assistance (ODA) rose by more than \$0.6 billion, but it declined slightly in relation to GNP. The increase in ODA was more than accounted for by bilateral aid; assistance on a multilateral basis declined slightly. Other official flows rose by \$1 billion in 1984 after falling sharply in 1983. In 1984, private resource flows increased by \$4 billion, reflecting rises in both direct investment and bank flows.

Net Flow of Financial Resources to Developing Countries
and Multilateral Agencies (DAC Basis)

(In billions of dollars)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984 1/</u>
<u>Total resource flows</u>	13.85	26.37	30.16	23.01	28.60
ODA	7.14	5.78	8.20	8.06	8.70
Bilateral	4.37	4.32	4.86	5.54	6.48
Multilateral	2.77	1.46	3.34	2.52	2.22
Other official flows	1.11	0.92	1.58	0.06	1.03
Private flows at market terms	4.30	18.66	19.10	13.58	17.42
Grants by private voluntary agencies	1.30	1.02	1.28	1.32	1.44

(As percent of GNP)

<u>Total resource flows</u>	0.53	0.90	0.98	0.69	0.76
ODA	0.27	0.20	0.27	0.24	0.23
Private flows at market terms	0.16	0.64	0.62	0.41	0.46

Budget authority for development assistance programs rose from \$8.3 billion in FY 1983 to nearly \$9 billion in FY 1984 (see tabulation below). According to estimates in the FY 1986 budget, spending authority for these programs is projected to rise to over \$10 billion in FY 1985, reflecting increases in all major aid programs. In contrast, such authority is projected to be lower in both FY 1986 and FY 1987. This projected decline reflects two decisions made in the preparation of the budget. First, a funding request for Israel under the Economic Support Fund was deferred pending the outcome of discussions with Israel, in an effort to determine the appropriate level of U.S. assistance in the context of Israel's plans for economic reforms. A separate request for

1/ Preliminary estimates.

such funding was to be presented at a later date. Second, while the Administration has stated its intention to honor existing commitments, it has not budgeted for the future replenishments of the multilateral development banks.

Budget Authority for U.S. Foreign Assistance
(Fiscal Years)

	<u>1983</u>	<u>1984</u>	<u>1985</u> <u>1/</u>	<u>1986</u>	<u>1987</u>
(In billions of dollars)					
<u>Bilateral assistance</u> <u>2/</u>	<u>6.53</u>	<u>7.32</u>	<u>8.25</u>	<u>7.10</u>	<u>7.03</u>
Economic Support Fund	3.09	3.39	3.84	2.82	2.88
Agency for International Development	1.86	2.01	2.29	2.11	2.13
Public Law 480 food assistance	1.03	1.38	1.54	1.30	1.30
Peace Corps	0.11	0.12	0.13	0.13	0.13
Refugee assistance	0.38	0.34	0.35	0.34	0.34
Other <u>2/</u>	0.07	0.08	0.10	0.40	0.25
<u>Multilateral assistance</u> <u>3/</u>	<u>1.81</u>	<u>1.64</u>	<u>1.91</u>	<u>1.55</u>	<u>1.55</u>
Multilateral development banks <u>3/</u>	1.54	1.32	1.55	1.35	1.35
International organizations	0.27	0.32	0.36	0.20	0.20
<u>Total foreign aid</u>	<u>8.33</u>	<u>8.96</u>	<u>10.16</u>	<u>8.65</u>	<u>8.58</u>
(As percent of total foreign aid)					
Bilateral assistance	78.3	81.7	81.2	82.1	81.9
Multilateral assistance	21.7	18.3	18.8	17.9	18.1

The distribution of U.S. bilateral ODA by major recipient countries is shown in the following tabulation.

-
- 1/ Includes FY 1985 supplemental requests by the Administration.
2/ Excludes offsetting receipts.
3/ Excludes callable capital.

Main Recipients of U.S. Bilateral ODA 1980-83 1/

(Net disbursements in millions of 1983 dollars)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Israel	936	849	808	1,292
Egypt	1,001	957	935	984
Grenada	--	--	--	226
Bangladesh	209	130	192	200
Costa Rica	4	5	43	200
Turkey	318	52	356	182
Sudan	72	70	136	158
Philippines	60	56	60	133
Pacific Islands (U.S.)	130	146	163	130
Jamaica	19	69	114	109
Peru	64	76	49	86
Indonesia	56	113	75	78
Kenya	47	85	54	74
Pakistan	50	101	116	59
Sri Lanka	66	34	51	58
Zimbabwe	29	29	7	56
Liberia	38	69	64	54
Bolivia	48	25	31	52
<u>Total</u>	<u>3,147</u>	<u>2,866</u>	<u>3,254</u>	<u>4,131</u>
As percent of allocated bilateral ODA	70	69	74	81

1/ Countries are ranked according to their 1983 ODA receipts.

Recent Movements in the Exchange Value of the Dollar

This appendix provides a brief empirical analysis of the behavior of the exchange value of the U.S. dollar in the past several years. In particular, it attempts to gauge the extent to which the recent appreciation of the dollar can be explained in terms of historical relationships. This analysis is based on equations that relate the real effective value of the dollar to such key explanatory variables as interest rate differentials, inflation rate differentials, and the net foreign liability position of the United States. An attempt was also made to examine the effects on the value of the dollar of changes in the perceived riskiness of holding assets in the United States compared with other countries.

The basic specification for the exchange rate equations presented in this appendix is derived by solving for the exchange rate in an asset demand function based on a portfolio balance model.^{1/} This specification relates the real effective value of the dollar to the differential between inflation-adjusted U.S. and foreign interest rates, and to the ratio of net foreign holdings of domestic assets to world wealth. A priori, it would be expected that changes in inflation-adjusted interest rate differentials favoring U.S. assets would boost the real value of the dollar. An increase in foreign holdings of domestic assets in relation to wealth would be expected to lower the real value of the dollar; in the absence of a change in real interest differentials, an increase in the supply of domestic assets relative to world demand would need to be associated with a reduction in the real value of the dollar in order to induce wealth holders to increase the portion of their wealth held in the form of dollar denominated assets.

The exchange rate equations were estimated using quarterly data for the period from the second quarter of 1973 (roughly the beginning of the period of generalized floating) to the fourth quarter of 1982. The estimated equations were then simulated from the first quarter of 1983 to the fourth quarter of 1984 to appraise their ability to predict recent movements in the value of the dollar. Numbers in parenthesis under the estimated coefficients are t-ratios.

$$z = 4.66 + 3.62 (r - r^*) - 0.18 F/W \quad (1)$$

(7.1) (2.9)

$$\bar{R}^2 = 0.73 \quad D.W. = 0.95$$

^{1/} For a more complete description of the theoretical model underlying the specification used in this appendix, see SM/83/152, Appendix X.

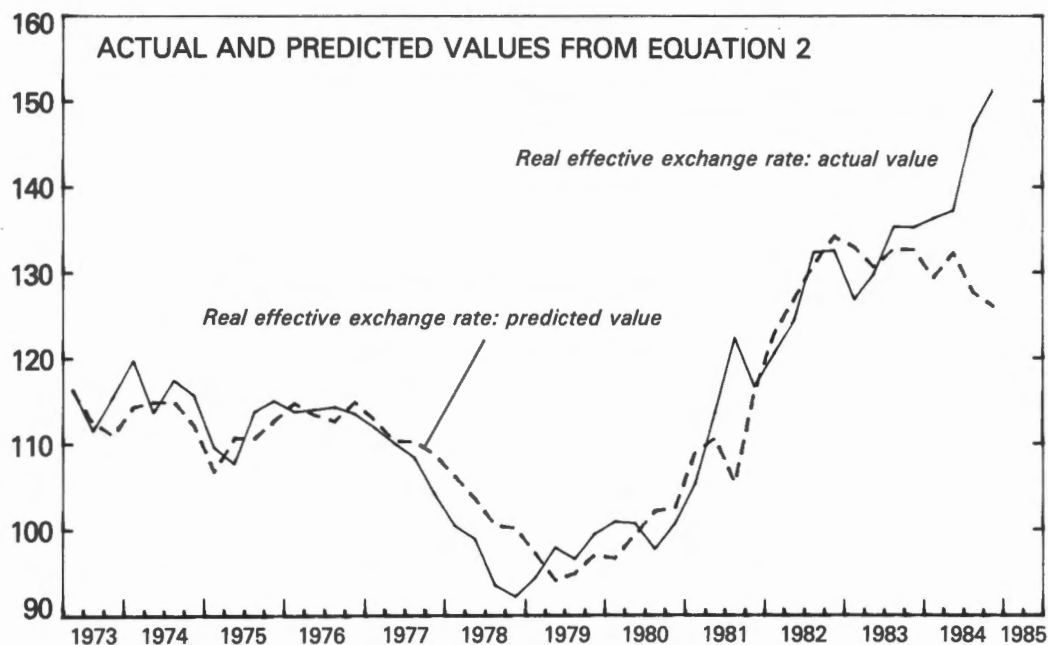
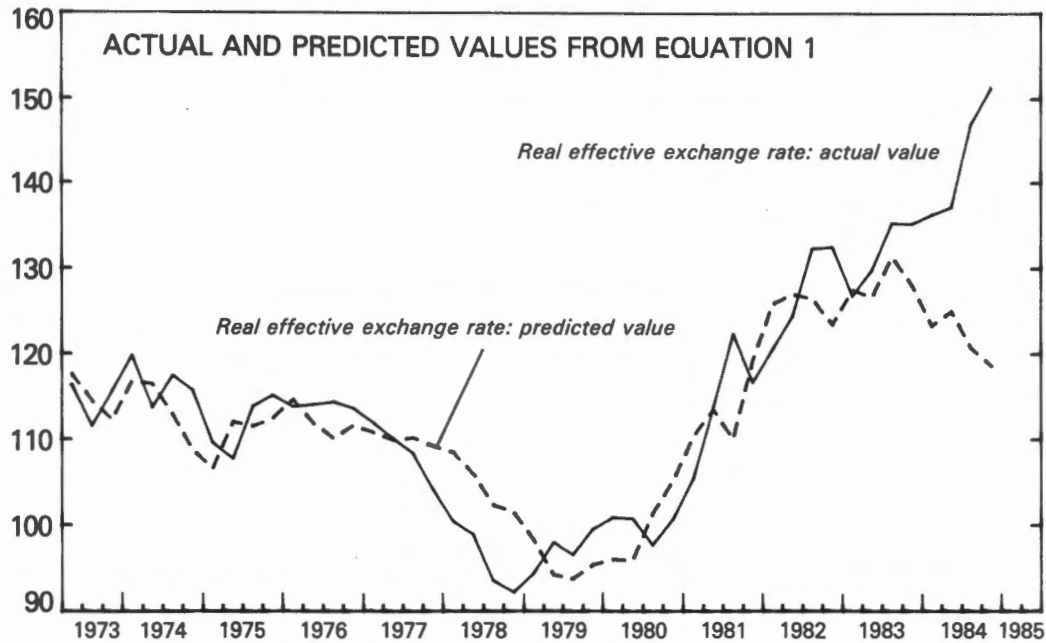
where:

- z = the natural logarithm of the real effective value of the dollar, measured in terms of U.S. consumer prices relative to a weighted average (1976 GNP weights) of consumer prices in Canada, France, Germany, Japan, Switzerland, and the United Kingdom. An increase in this variable represents an appreciation of the dollar.
- r = U.S. inflation-adjusted long-term interest rate, measured as the nominal interest rate on long-term U.S. Government bonds less the 12-month rate of change in consumer prices.
- r* = foreign inflation-adjusted long-term interest rate, measured as the weighted average (1976 GNP weights) of nominal rates on medium to long-term Government bonds in Canada, France, Germany, Japan, Switzerland, and the United Kingdom less a weighted average of the 12-month rate of change in consumer prices in these countries.
- F = net U.S. liabilities to foreigners, measured as U.S. private liabilities to foreigners plus U.S. liabilities to official agencies of OPEC members, less U.S. private claims on foreigners.
- W = net world wealth at the beginning of the period, measured as the sum of wealth variables for the United States, other major industrial countries, and members of OPEC. For the United States, wealth was defined in terms of the Federal Reserve's measure of U.S. household net worth. For other major industrial countries (Canada, France, Germany, Japan, and the United Kingdom) wealth was defined as the sum of net government debt (excluding intragovernment holdings), the private capital stock (derived by cumulating net investment flows), and the cumulative current account balance. Wealth of OPEC members is proxied by cumulating the trade balances of these countries.

The upper panel of Chart 1 shows the actual real effective value of the dollar and the values predicted by equation (1). Outside of the period in which the equation was fitted, the errors between actual and predicted values increase and become particularly large in the second half of 1984. During that period, real interest rate differentials favoring dollar assets narrowed and net U.S. liabilities to foreigners registered a substantial increase; nonetheless, the real effective value of the dollar rose sharply.

The large difference between the actual values of the dollar and the values predicted by equation (1) over the period 1983-84 reflect the influence of factors not accounted for by the variables in the equation. Such factors may include the relatively favorable climate

CHART 1
UNITED STATES
THE REAL EFFECTIVE EXCHANGE RATE¹



¹Measured in terms of U.S. consumer prices relative to a weighted average (1976 GNP weights) of consumer prices adjusted for exchange rates of Canada, France, Germany, Japan, Switzerland, and the United Kingdom.

for investment in the United States and inflows of capital seeking a safe haven as a result of economic and political uncertainties in other countries.

In an effort to account for the impact of changes in economic and political uncertainties on the real value of the dollar, an alternative form of equation (1) was estimated. A measure of sovereign risk (v) was included among the explanatory variables in the alternative equation. This risk variable was defined as the difference between the average yield on U.S. dollar denominated bonds issued by European governments in the Eurobond market and the yield on U.S. Treasury securities of comparable maturities. Since these assets have the same maturity and are denominated in the same currency, the yield spread would reflect the difference in the relative risk (other than exchange risk) of holding European versus U.S. Government obligations. An increase in such risk would be expected to raise the real value of the dollar.

Equation (2) also includes as an explanatory variable the ratio of the cumulative statistical discrepancy in the U.S. balance of payments (S) to world wealth. The statistical discrepancy is believed to be related predominantly to unrecorded movements of private capital. More specifically, there are reasons to believe that the large unrecorded inflows registered in the U.S. balance of payments in recent years might reflect capital flows attracted to the United States by considerations other than relative real interest rates, such as the security of U.S. assets in relation to assets held in other countries ("safe haven" effects). Under this hypothesis, an increase in the net inflow on the discrepancy could be expected to raise the value of the dollar. The alternative equation is presented below:

$$z = 4.63 + 3.49 (r - r^*) + 4.19 v - 0.12 F/W + 0.11 S/W \quad (2)$$

(8.0) (3.3) (1.6) (4.3)

$$\overline{R}^2 = 0.79 \quad D.W. = 1.18$$

The estimation results from equation (2) suggest that the value of the dollar may indeed have been boosted by changes in the relative riskiness of U.S. and foreign assets. Coefficients for both the v and S variables in equation (2) were found to have the expected signs and to be statistically significant. The lower panel of Chart 1 shows actual values for the dollar compared with the predicted values from equation (2). As the chart illustrates, equation (2) performs somewhat better than equation (1) in explaining movements in the value of the dollar in 1983-84; however, a substantial portion of the real appreciation of the dollar, particularly in the second half of 1984, remains unexplained.

Fiscal Deficits, the External Current Account, and
the Saving-Investment Balance

This appendix presents an accounting framework to evaluate the interaction between fiscal deficits, private savings, capital formation, and the current account of the balance of payments in the United States. In the first section of the appendix this framework is used to examine the experience of the past several decades. Alternative scenarios dealing with the prospects for the period 1985-90 are discussed in the second section.

1. Overview

The sources and uses of funds available to the U.S. economy are presented in the tabulation below. To begin with the sources of funds, in the period since the 1950s gross private saving (including personal and corporate saving) has risen slowly in relation to GNP. In 1983, the ratio of gross private saving to GNP was 1 1/4 percentage point higher than its average level in the 1950s; from 1983 to 1984 this ratio increased by more than 1 percentage point owing to a sharp cyclical rebound in retained corporate profits.^{1/} The financial position of the state and local governments shifted from small deficits in the 1950s and early 1960s to surpluses in the period after 1967; these surpluses continued into the 1980s when they averaged more than 1 percent of GNP. For most of the period since 1950 the United States has been a net lender to the rest of the world. In recent years, however, there has been a growing net inflow of foreign saving into the United States.^{2/}

^{1/} It should be noted that the upward trend in gross private saving in relation to GNP since the 1960s is more than accounted for by a rise in the ratio of capital consumption allowances to GNP. The ratio of net private saving to net national product rose from an average of 8 percent in the 1950s to an average of 8 1/2 percent in the 1960s, and then dropped to an average 8 percent in the 1970s and averaged 6 1/2 percent in the period 1980-83. In 1984 net private saving rose to 8 1/4 percent of net national product.

^{2/} Net foreign investment, as defined in the National Income and Product Accounts of the United States, is roughly equivalent to the deficit in the current account of the balance of payments. The difference is mainly due to the treatment of capital gains and losses associated with direct investment income.

Sources and Disposition of Funds

	<u>Average</u>							
	<u>1950s</u>	<u>1960s</u>	<u>1970s</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
	<u>(In percent of GNP)</u>							
<u>Sources:</u>								
<u>Total</u> <u>1/</u>	15.6	15.8	17.8	17.6	18.3	18.4	19.7	22.4
Gross private saving	16.0	16.3	16.9	16.6	17.2	17.1	17.3	18.4
State and local government surplus	-0.2	--	0.9	1.2	1.3	1.1	1.4	1.4
Net inflow of foreign saving	-0.2	-0.5	--	-0.2	-0.2	0.2	1.0	2.6
<u>Disposition:</u>								
<u>Total</u> <u>1/</u>	15.9	15.8	17.9	17.5	18.6	18.3	19.7	22.2
Gross residential fixed investment	5.4	4.4	4.6	3.9	3.5	3.0	4.0	4.2
Inventory accumulation	1.0	1.1	0.8	-0.4	0.9	-0.9	-0.4	1.6
Gross nonresidential fixed investment	9.6	10.0	10.7	11.7	12.0	11.4	10.7	11.6
Subtotal:								
Gross investment	16.0	15.5	16.1	15.2	16.4	13.5	14.3	17.4
Federal government deficit	-0.1	0.3	1.8	2.3	2.2	4.8	5.4	4.8
	<u>(In percent of net national product)</u>							
<u>Memorandum item:</u>								
Net nonresidential fixed investment	3.1	3.7	3.4	3.3	3.4	2.3	1.7	3.1

Regarding the demand for saving, the Federal Government has been a net borrower since 1960 and its borrowing requirements have increased substantially in the past several years. Gross investment has not changed markedly in relation to GNP in the past three decades, but its composition is now significantly different from what it was in the 1950s and 1960s. As a ratio to GNP, gross residential investment and stock-building have declined while gross nonresidential fixed investment has increased. It should be noted in this connection that since the mid-1960s investment for replacement purposes has tended to rise more

1/ Sources and disposition of funds may not add up to the same total because of the statistical discrepancy in the National Income and Product Accounts.

rapidly than gross nonresidential investment;^{1/} during the same period, additions to the capital stock (net nonresidential investment) have tended to decline in relation to net national product.

In the period 1980-84 there was a strong increase in total investment; at the same time, the federal fiscal deficit and the inflow of foreign capital have grown to levels that are very high by historical standards. From 1980 to 1984 the federal fiscal deficit increased in relation to GNP from 2 1/4 percent to 4 3/4 percent. Over the same period gross domestic investment rose from 15 1/4 percent of GNP to 17 1/2 percent of GNP, largely because of a rise in inventory investment. Thus, from 1980 to 1984 the total demand for saving in the United States increased in relation to GNP by almost 5 percentage points. Over the same period, the rise in domestic saving (including private saving and the surplus of the state and local governments) was only a little more than 2 percentage points. The growing difference between the demand and the domestic supply of saving was reflected in a rising dependence on foreign saving, as the external balance moved from a small net outflow of saving to a net inflow of more than 2 1/2 percent of GNP.

2. Alternative medium-term scenarios

In this section the period from 1985 to 1990 is examined and an attempt is made to determine the levels of investment required to sustain the rate of economic growth underlying both the staff's medium term forecast and the Administration's FY 1986 budget projections (see following tabulation). The inflow of foreign saving required to finance the necessary investment is then derived under specific assumptions regarding the fiscal positions of the federal and state and local governments and the behavior of private domestic saving.

Alternative Economic Projections

(Percentage change at annual rates)

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>Average 1985-90</u>
<u>Staff</u>							
Real GNP	2.8	3.3	2.7	2.7	2.9	3.0	2.9
GNP deflator	3.8	3.8	4.0	4.0	4.3	4.5	4.1
Nominal GNP	6.8	7.2	6.8	6.8	7.3	7.6	7.1
<u>Administration's FY 1986 budget</u>							
Real GNP	3.9	4.0	4.0	4.0	3.9	3.6	3.9
GNP deflator	3.8	4.4	4.2	3.9	3.6	3.3	3.9
Nominal GNP	7.8	8.5	8.3	8.1	7.6	7.1	7.9

^{1/} The reasons for this tendency are explained in detail in Appendix I.

For each of the projections the level of investment needed to sustain the rate of growth of real GNP is determined by using the following aggregate production function:

$$\dot{Q}_t = \dot{A}_t + 0.25 \dot{K}_t + 0.75 \dot{L}_t$$

where,

$\dot{Q}_t$ = growth rate of output

$\dot{A}_t$ = growth of multifactor productivity

$\dot{K}_t$ = growth rate of the nonresidential net capital stock

$\dot{L}_t$ = growth rate of hours of labor services

Multifactor productivity is a measure of the effects of changes in technology, utilization of capacity, organization of production, and managerial skill on the level of output. As such, multifactor productivity has both a cyclical and a trend component. As the following tabulation indicates, multifactor productivity has been on a downward trend since 1973. There was a rebound in productivity in 1983 and 1984, but it appears to have been primarily cyclical in nature; multifactor productivity declined in the first quarter of 1985.

Private Nonfarm Business Sector

(Percentage change at annual rates)

	Averages		
	1948-83	1948-73	1973-83
Output per hour of all persons	2.0	2.5	0.8
Minus: contributions of capital services per hour to output per hour <u>1/</u>	0.8	0.8	0.7
Equals: Multifactor productivity <u>2/</u>	1.2	1.7	0.1

For the purposes of the scenarios presented below, it is assumed that multifactor productivity growth will pick up gradually over the period 1985-90, rising from about 1/4 percent in 1985 to 1 percent in 1990. The growth rate of labor services is assumed to be 1 1/2 percent

1/ Change in capital services per hour, weighted by the share of capital in current dollar output.

2/ Output per hour of combined labor and capital inputs.

a year, about the same as the average annual growth over the period 1948-84. In addition, it is assumed that in a given year output growth in excess of potential ^{1/} does not result in a change in the degree of capacity utilization but is obtained by absorbing labor at a rate above the trend growth of labor services, thus leading to a decline in the unemployment rate. On the basis of these assumptions, realization of the staff's forecast would require average growth of the net nonresidential capital stock at about 4 1/4 percent a year from 1985 to 1990; the scenario based on the Administration's projections would require average growth on the order of 7 1/4 percent a year over the same period. In the terms of gross nonresidential investment, achievement of the staff's forecast would mean that gross nonresidential investment would have to average 13 percent of GNP from 1985 to 1990, reflecting both the required increase in the net nonresidential capital stock and a continuation of the upward trend in capital consumption allowances to GNP. The scenario based on the Administration's projections would require nonresidential investment to average 15 3/4 percent of GNP, a level that is beyond the range of historical experience.

Other assumptions concerning the sources and uses of funds are as follows.^{2/} Gross residential investment would decline from 4 1/4 percent of GNP in 1984 to just over 3 1/2 percent of GNP in 1985 and would remain at that level through 1990. Inventory accumulation in relation to GNP would also slow from 1 1/2 percent in 1984 to 1 percent in 1985 and to 3/4 percent a year from 1986 to 1990. The federal fiscal deficit in the staff's medium-term scenario would rise from 4 3/4 percent of GNP in 1984 to just over 5 percent of GNP in 1985 and would then drop to around 4 percent of GNP in 1990.^{3/} The scenario based the Administration's economic forecast is presented under two alternative assumptions regarding the federal fiscal position. The first scenario is based on the current services estimate of the federal deficit--in which case the deficit would decline from about 5 3/4 percent of GNP in 1985-86 to 3 3/4 percent in 1990. The second scenario assumes that the deficit reduction measures contained in the FY 1986 budget will be enacted--in which case the deficit would decline steadily from 4 3/4 percent of GNP in 1985 to 1 1/4 percent of GNP in 1990.

^{1/} The staff projections are based on an average rate of growth of potential output of 2 3/4 percent a year; the scenario based on the Administration's economic forecast is based on average growth of potential of 3 1/2 percent a year.

^{2/} For simplicity, sources and uses of funds, other than the fiscal deficit and gross nonresidential fixed investment, are assumed to be the same in the staff's projections and in the scenario based on the Administration's economic projections.

^{3/} The staff's forecast assumes measures to reduce the federal deficit below current services--the deficit projected under existing spending programs and the present tax system--by \$40 billion in 1986, \$55 billion in 1987, and \$65 billion in 1988. In addition to the fiscal cuts, the difference between the staff's and the Administration's deficit projections is related to the differences in economic assumptions discussed above.

As regards the sources of funds, gross private saving are assumed to rise from 18 percent of GNP in 1985 to around 18 3/4 percent of GNP in 1990, extending the slow upward trend of the past 30 years. The surplus of the state and local governments would fall from its unusually high level of about 1 1/2 percent of GNP in 1984 to 1 percent of GNP in 1990. For the purpose of the exercise, the inflow of foreign saving is derived residually, i.e., it is set equal to the gap between the total demand for funds and the domestic supply of funds.

Table 1 indicates that achieving the average annual growth of output of 4 percent that underlies the Administration's economic projections would involve growth in the net capital stock and levels of nonresidential investment that are unusually large by historical standards. If no action to improve the federal fiscal position were taken, the necessary inflow of foreign saving would average 5 1/2 percent of GNP a year over the period 1985-90. Even if the FY 1986 budget proposals were implemented in full, the inflow of foreign saving would need to average 3 1/2 percent a year over the period 1985-90. Inflows of this magnitude over a sustained period are well beyond the levels that can be prudently expected. On the basis of the analysis presented in this Appendix it would not seem possible to achieve economic growth of the order projected by the Administration in the FY 1986 budget.

Table 2 indicates that moderate growth of the order contained in the staff's medium-term forecast can be achieved provided that action to reduce the size of the federal fiscal deficit is taken. Under this scenario the required inflow of foreign saving would average just over 2 percent of GNP a year, and by 1990 the external current account deficit would be down to \$70 billion, or 1 1/4 percent of GNP. Of course, it cannot be taken for granted that capital inflows of even this magnitude will be forthcoming. If the adjustment in the current account were to be larger than is envisaged in this scenario, achievement of output growth of 3 percent a year would require more substantial action to correct the fiscal imbalance. For example, if the current account were to move gradually toward balance in 1990, the fiscal deficit would have to be reduced further by an average of 3/4 percent of GNP (an average of \$35 billion) a year from 1985 through 1990.

Table 1. United States: Sources and Disposition of Funds: A Scenario Based on the Administration's Economic Projections in the FY 1986 Budget

(In percent of GNP)

	1985	1986	1987	1988	1989	1990
<u>Disposition of funds:</u>						
Gross nonresidential investment	15.3	16.0	16.0	15.9	15.9	15.9
Gross residential investment	3.6	3.6	3.6	3.6	3.6	3.6
Inventory accumulation	1.0	0.7	0.7	0.7	0.7	0.7
Federal fiscal deficit:						
a. Current services 1/	5.3	5.8	5.3	4.9	4.3	3.8
b. Budget proposal 1/	<u>4.7</u>	<u>3.7</u>	<u>2.7</u>	<u>2.5</u>	<u>1.7</u>	<u>1.2</u>
Total:						
a. Current services	25.2	26.1	25.6	25.1	24.5	24.0
b. Budget proposal	24.6	24.0	23.0	22.7	21.9	21.4
<u>Sources of funds:</u>						
Gross private saving	18.0	18.0	18.2	18.4	18.6	18.8
State and local government surplus	<u>1.5</u>	<u>1.3</u>	<u>1.3</u>	<u>1.2</u>	<u>1.1</u>	<u>1.0</u>
Subtotal	19.5	19.3	19.5	19.6	19.7	19.8
<u>Required net inflow of foreign saving:</u>						
a. Current services	5.7	6.8	6.1	5.5	4.8	4.2
b. Budget proposal	5.1	4.7	3.5	3.1	2.2	1.6
(In current dollars):						
a. (Current services)	(225)	(291)	(283)	(276)	(259)	(243)
b. (Budget proposal)	(201)	(201)	(163)	(156)	(119)	(93)

1/ Staff estimates based on the FY 1986 budget.

3.7

Table 2. United States: Sources and Disposition of Funds
Underlying the Staff's Medium-Term Scenario

(In percent of GNP)

	1985	1986	1987	1988	1989	1990
<u>Disposition of funds:</u>						
Gross nonresidential investment	13.1	13.1	13.0	12.9	12.8	12.7
Gross residential investment	3.6	3.6	3.6	3.6	3.6	3.6
Inventory accumulation	1.0	0.7	0.7	0.7	0.7	0.7
<u>Federal fiscal deficit</u>	<u>5.1</u>	<u>4.5</u>	<u>4.4</u>	<u>4.3</u>	<u>4.1</u>	<u>4.1</u>
<u>Total</u>	<u>22.8</u>	<u>21.9</u>	<u>21.7</u>	<u>21.5</u>	<u>21.2</u>	<u>21.1</u>
<u>Sources of funds:</u>						
Gross private saving	18.0	18.0	18.2	18.4	18.6	18.8
State and local government surplus	1.5	1.3	1.3	1.2	1.1	1.0
<u>Subtotal</u>	<u>19.5</u>	<u>19.3</u>	<u>19.5</u>	<u>19.6</u>	<u>19.7</u>	<u>19.8</u>
Required net inflow of foreign saving	3.3	2.6	2.2	1.9	1.5	1.3
(In current dollars)	(125)	(109)	(98)	(90)	(77)	(70)

The Administration's Tax Reform Proposals

On May 28, 1985 the President announced proposals to reform the tax system with a view to increasing its fairness and simplicity and improving the allocation of resources in the economy, while leaving the total level of revenues approximately unchanged. The ultimate goal of the proposals was to treat all income uniformly and equally, no matter what its source, in determining the amount of tax to be paid. In this way the impact of the tax structure on economic decision-making would be minimized, and a more efficient allocation of resources would be achieved. In addition, the proposals endeavored to facilitate compliance with the law by reducing the complexity of the tax system. The plan would lower individual tax payments but would raise corporate tax receipts by a similar amount (in relation to current services estimates) over the period through FY 1990 (see following tabulation).

Change in Receipts, Fiscal Years

(In billions of dollars)^{1/}

	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
<u>Total</u>	<u>1.2</u>	<u>0.4</u>	<u>-7.3</u>	<u>-4.6</u>	<u>-1.2</u>
Of which:					
Individual taxes	-17.9	-26.0	-32.0	-29.0	-26.9
Corporate taxes	18.9	26.1	24.3	23.9	25.2
Estate and gift taxes	--	--	--	--	--
Excise taxes	0.2	0.3	0.4	0.4	0.4

1. Individual taxes

The tax reform plan would broaden the individual income tax base by eliminating or curtailing certain deductions from taxable income and lower the average tax rate. As a result, total taxes paid by individuals would be reduced by 7 percent. The effects of some of the main tax reform proposals is presented in Table 1.

The measures aimed at broadening the tax base included the repeal of itemized deductions for state and local taxes that are not incurred in an income-producing activity; the curtailment of tax shelters, including a \$5,000 limitation on interest deductions other than mortgage payments for principal residences; the elimination of the deduction for entertainment expenses related to the taxpayer's trade or business; and limitation of the deduction for business meals to \$25 per person. In addition, workers' compensation payments as well as black lung benefits paid to disabled coal miners (which are currently excluded from

^{1/} Based on the April update of the FY 1986 budget.

income and therefore not subject to tax) would be treated as taxable income.^{1/} Unemployment compensation, which is now subject to tax only if the taxpayer's total income including such benefits exceeds \$12,000, would be counted as taxable income irrespective of the taxpayer's total income. Employer contributions to health insurance plans on behalf of an employee, which are at present excluded from the employee's gross income, would be included in gross income up to \$120 a year for individual coverage and \$250 a year for family coverage. Other deductions and exclusions would be retained, including the home mortgage interest deduction for a taxpayer's principal residence, the preferred tax treatment for social security beneficiaries and disabled veterans, and itemized deductions for charitable contributions. In addition, interest earned on general purpose state and local bonds would continue to be exempt from tax.

The most important measures aimed at lowering tax rates would be a cut in the maximum tax rate from 50 percent to 35 percent and a reduction in the number of tax brackets from 19 to 3.^{2/} As a result, marginal tax rates would be reduced by an average of 19 percent. The President's proposals also included the following: an increase in the personal exemption from \$1,040 to \$2,000 (an amount that would be indexed to protect against inflation); an increase in the tax-deferred contribution to a spouse's individual retirement account from \$250 to \$2,000; and an increase in the tax benefit for the elderly, blind, and disabled.

2. Corporate taxes

The tax reform plan involved a reduction in corporate tax rates and a sizable broadening of the tax base--for example, repeal of the investment tax credit, and the matching of income and deductible costs that arise from multi-period production--so that total corporate tax payments would increase over the period FY 1985 to FY 1990. The proposals dealt with statutory corporate tax rates, dividend payments, capital gains, expenditures for research and development, the investment tax credit, and depreciation allowances. The impact of specific proposals on revenues is covered in Table 2. As regards the corporate tax, the maximum rate currently imposed on corporations is 46 percent for taxable income in excess of \$100,000. For taxable income below \$100,000 the tax rate is determined by a graduated schedule in which the rate increases from 15 percent on taxable income under \$25,000 to 40 percent on income from \$75,000 to \$100,000. The proposals would

^{1/} All payments for medical services, physical and vocational rehabilitation would continue to be excluded from tax.

^{2/} For joint returns the rates would be: 0 percent for taxable income up to \$4,000; 15 percent on the amount from \$4,000 to \$29,000; 25 percent on the amount from \$29,000 to \$70,000; and 35 percent on the amount over \$70,000. Under current law, the zero tax bracket applies to income under \$2,480 and income above \$48,230 is taxed at a marginal rate higher than 35 percent.

lower the maximum tax rate to 33 percent and the threshold level of taxable income on which it would be applied would be \$75,000. For taxable income below \$75,000, the tax rate would rise on the basis of a graduated schedule from 15 percent on income below \$25,000 to 25 percent on income from \$50,000 to \$75,000.

The treatment of dividends and capital gains would be altered by the tax reform plan. In order to provide some relief from the double taxation of corporate earnings distributed as dividends, domestic corporations would be allowed a deduction of 10 percent of dividends paid to shareholders. However, on the side of the individual, the current exemption from gross income of the first \$100 of dividend payments received would be repealed.

Long-term capital gains,^{1/} under current law, receive preferential tax treatment. For individuals and other non-corporate taxpayers, 60 percent of the long-term capital gain is excluded from income, and the remainder is taxable at ordinary rates. For example, a taxpayer in the maximum 50 percent bracket has a marginal tax rate on net capital gains of 20 percent. The Administration is proposing that the exclusion rate on capital gains for individuals and non-corporate taxpayers be reduced from 60 percent to 50 percent. However, since the tax reform plan calls for a substantial reduction in marginal tax rates, the tax preference given for the acquisition of long-term capital assets would in fact be increased. By way of illustration, an individual now in the 50 percent bracket would fall in the proposed maximum bracket of 35 percent; as a result, the marginal tax rate on capital gains would fall from 20 percent to 17 1/2 percent. For corporations the current maximum tax rate of 28 percent on capital gains would be retained.

As regards the matching of income and expenses from multiperiod production, under current law taxpayers are allowed to deduct certain costs prior to the realization of income from a particular investment. For example, timber producers are allowed to deduct certain growing expenses and carrying costs prior to the realization of income from timber production. The tax reform plan would require businesses to match expenses with income generated by investment so that the timing of the tax liability is more accurately matched to the receipt of income. In effect, this provision would postpone some deductions, thereby accelerating tax receipts.

Expenditures for research and development now receive a 25 percent tax credit. The tax credit, however, is scheduled to expire on December 31, 1985. The tax proposals would extend the tax credit for three years, but the definition of qualified research would be revised in order to stimulate research activities in areas likely to result in technological innovation.

^{1/} Long-term capital gains are defined as gains on assets held for more than six months, or one year for assets acquired before June 23, 1984.

As regards depreciation allowances, the current Accelerated Cost Recovery System (ACRS) would be replaced by the Capital Cost Recovery System (CCRS). ACRS, which was enacted in 1981, was designed to overcome the shortcomings of the previous system of depreciation allowances. Under the pre-ACRS system, capital costs were recovered over the useful economic life of an asset based on historical, or nominal, cost. In periods of inflation real economic depreciation was understated and, therefore, income was overtaxed. ACRS attempted to redress the overtaxation of income by substantially shortening the depreciable lives of assets--machinery and equipment was classified as having a depreciable life of either three years or five years and structures were assigned a depreciable life of 18 years--and by providing more rapid depreciation schedules.^{1/} However, at low inflation rates, the system of accelerated depreciation resulted in depreciation deductions in excess of economic depreciation and therefore lowered the effective corporate tax rate below the statutory tax rate. In addition, effective tax rates were not uniform across types of assets; in combination with the investment tax credit ACRS resulted in an effective tax rate for machinery and equipment that was substantially below the effective tax rate for structures (see tabulation below).

The Administration's proposals would modify the ACRS by basing depreciation allowances on the inflation-adjusted cost of capital goods, rather than on historical costs. In addition, in order to reflected more fully an asset's actual economic depreciation, the number of recovery categories would be expanded from three to six. However, the cost recovery period assigned for each category of asset would be shorter than one which fully reflected real economic depreciation. For all types of capital goods, CCRS would provide higher depreciation allowances than are available under ACRS. The investment tax credit, which originally was enacted to offset the effect of inflation on depreciation allowances for machinery and equipment, would be repealed. As a result of the changes described above, the average effective corporate tax rate on all capital goods would fall from 35 percent (assuming a 5 percent rate of inflation) to 25 percent under CCRS (see following tabulation). However, while the effective tax rate on structures and inventories would decline substantially, the effective tax rate on equipment and machinery would rise sharply at low rates of inflation as a result of the repeal of the investment tax credit.

^{1/} For a detailed description of ACRS and the pre-ACRS depreciation system see Appendix I.

Effective Corporate Income Tax Rates on Equity Financed
Investments 1/

	<u>All Capital 2/</u>	<u>Equipment and Structures</u>	<u>Machin- ery and Equip- ment</u>	<u>Struc- ture</u>	<u>Inven- tories</u>
Pre-1981 law at 10 percent inflation <u>2/</u>	48	48	31	53	46
ACRS <u>3/</u>					
With investment tax credit:					
at 10 percent inflation	41	40	20	45	46
at 5 percent inflation	35	31	-4	39	46
Without investment tax credit at 5 percent inflation	46	41	39	41	39
Capital Cost Recovery System					
With 10 percent di- vidend relief <u>4/</u>	25	22	17	24	32

1/ Based on a real return of 4 percent after corporate tax and on the assumption that the returns to capital are distributed equally between dividends and capital gains.

2/ Based on corporate tax rate of 46 percent. For equipment, a "sum of years depreciation rate" based on a depreciable life of nine years is used in combination with a 10 percent investment tax credit. For structures, a 150 percent declining balance depreciation is used based on a 34.4 year life.

3/ Based on 46 percent corporate tax rate, a five-year depreciation schedule for equipment, and an 18-year schedule for structures.

4/ Based on a corporate tax rate of 26.5 percent, and a 10 percent deduction for dividends paid.

Table 1. United States: Change in Individual Tax Receipts
Relative to Current Services Estimates, Fiscal Years 1/

(In billions of dollars)

	1986	1987	1988	1989	1990
Tax schedule simplification and rate reduction	-11.1	-49.5	-60.6	-66.7	-72.7
Increase in zero bracket amount	-4.4	-6.2	-6.6	-7.1	-7.6
Increase in the taxpayer and dependent exemption to \$2,000	-18.8	-39.1	-42.1	-45.1	-42.0
Include a portion of employer provided health insurance in taxable income	2.4	3.5	3.7	3.8	4.0
Include unemployment benefits, workers' compensation and black lung benefits	--	0.6	2.8	2.6	2.9
Repeal of deduction for state and local taxes	4.5	33.1	34.1	37.0	40.0
Curtailement of tax shelters	0.2	0.8	1.4	2.8	3.4

1/ The table does not contain all of the proposed measures affecting individual taxes and therefore the sum of the items in the table does not equal the total change in revenue from individual sources.

Table 2. United States: Change in Corporate Tax Receipts
Relative to Current Services Estimates, Fiscal Years 1/

(In billions of dollars)

	1986	1987	1988	1989	1990
Revision in corporate tax rates and the rate structure	-10.0	-26.7	-35.9	-39.0	-41.8
10 percent dividend exclusion	--	-3.4	-6.2	-7.2	-8.0
Revise the capital gains exclusion <u>2/</u>	0.6	2.9	4.6	5.0	5.4
Matching of income and expenses from multi-period production	2.3	5.1	8.3	11.4	12.7
Extend the credit for research and development	-0.6	-1.2	-1.5	-1.7	-1.9
Replace ACRS with CCRS	0.3	-0.7	2.3	8.7	15.4
Repeal of the investment tax credit	14.0	25.6	29.4	33.3	37.4
Recapture tax	7.6	19.4	20.4	9.1	--

1/ The table does not contain all of the measures affecting corporate taxes included in the proposals and, therefore, the sum of the entries does not equal the total change in revenue from corporate sources.

2/ This measure affects personal tax payments.

The proposed reduction in statutory corporate tax rates would produce a windfall gain for firms using accelerated depreciation schedules.^{1/} The Administration's tax reform proposals included a provision that aimed at capturing this gain. A corporation would be subject to a recapture tax if the total value of depreciation allowances using ACRS over the period January 1, 1980-July 1, 1986 exceeded by at least \$400,000 the total depreciation allowances that would have been available using straight-line depreciation over the same period. This difference would be referred to as excess depreciation and the amount of tax to be paid would be determined by the following rule: \$300,000 of excess depreciation would be exempt from tax and of the remainder 12 percent would be included as ordinary taxable income in both 1986 and 1987, and 10 percent would be included in 1988. The addition to income--40 percent of excess depreciation altogether--would be taxed at the new corporate tax rate of 33 percent. The effect on the tax liability would be the same as if all the excess depreciation were taxed at 13 percent, the difference between the old and new corporate rates.

^{1/} The effect of using an accelerated depreciation method is that tax liability is deferred to later years. As long as the tax rate remains constant over the life of an asset, the amount of tax that is deferred as a result of accelerated depreciation is equal to the amount of tax that is used in later years. A reduction in tax rates would, therefore, produce an unexpected benefit by reducing the tax that must be paid rather than simply deferring the tax.

Recent Developments in the Operating Procedures
of the Federal Reserve

1. Introduction

Since 1975, the Federal Reserve has announced targets for rates of growth of the monetary aggregates that are used as guides for the conduct of monetary policy. The operating procedures to be followed in order to achieve these objectives are established by the Federal Open Market Committee (FOMC). The FOMC meets eight times each year to provide policy directives to the Open Market Desk of the Federal Reserve Bank of New York (FRBNY) on how open market operations should be conducted in the period between meetings. Twice since the introduction of monetary targeting the Federal Reserve has changed the operating procedures by which it seeks to achieve its policy objectives; in the process, the focus of monetary management has shifted from the federal funds rate to nonborrowed reserves, and more recently to borrowed reserves. This appendix describes these three different operating procedures and compares the results achieved under the alternative policy regimes.^{1/}

2. Targeting on the federal funds rate

Between 1975 and September 1979, the Federal Reserve attempted to control the growth of the monetary aggregates by conducting open market operations to supply reserves to the banking system as necessary to keep the federal funds rate within a relatively narrow range that was specified at each FOMC meeting.^{2/} The manager of the Open Market Desk of the FRBNY was authorized to allow the federal funds rate to move toward the top or bottom of the specified range if the money stock moved above or below the level desired by the FOMC. The interest-rate range could be raised or lowered at meetings of the FOMC as thought necessary to ensure growth of the monetary aggregates in line with longer-run targets of the Federal Reserve.^{3/}

^{1/} A broad discussion of the Federal Reserve's approach to monetary policy in the last 10 years is provided by Stephen Axilrod, "U.S. Monetary Policy in Recent Years: An Overview," Federal Reserve Bulletin, Volume 71, pp. 14-24 (January 1985). For an account of the system of targeting on borrowed reserves, see Henry Wallich, "Recent Techniques of Monetary Policy," Remarks to the Midwest Finance Association (April 5, 1985). The different operating procedures used by the Federal Reserve are compared in a simple analytical framework by R. Anton Gilbert, "Operating Procedures for Monetary Policy," Review of the Federal Reserve Bank of St. Louis, Volume 68, No. 2, pp. 13-21 (February 1985).

^{2/} The federal funds rate is the interest rate that banks and other depository institutions charge for surplus reserves that they lend to one another, usually on an overnight basis.

^{3/} The range for the federal funds rate could be changed in the intermeeting period by a telephone conference of the FOMC.

A major benefit of these operating procedures was perceived to be that the Federal Reserve would act automatically to supply or withdraw reserves to or from the banking system so as to offset the effect of transitory disturbances on the federal funds rate. Such disturbances might arise, for example, from shifts in the demand for reserves due to random fluctuations in the public's demand for money or in banks' demand for excess reserves, which would not be expected to have a significant impact on prices or economic activity. However, movements in the federal funds rate were to be allowed as necessary to ensure that the growth rate of the money supply over longer periods was in line with the Federal Reserve's objectives.

In practice, the main problem with these procedures was that, in attempting to stabilize the federal funds rate, the Federal Reserve often delayed adjusting the target range for that interest rate for lengthy periods of time. As a result, there was a tendency for changes in the demand for reserves that reflected more fundamental economic factors (such as rapid growth of aggregate demand) to be accommodated, and actual monetary growth often was allowed to overshoot the target ranges.

3. Targeting on nonborrowed reserves

During the late 1970s, a rising rate of inflation undermined public confidence in the Federal Reserve's determination to achieve price stability. On October 6, 1979, as part of a broad anti-inflationary program, the FOMC decided to place greater emphasis on controlling reserves directly in order to provide more assurance of attaining money supply targets and thus bring down the rate of inflation. Under the new procedures, open market operations were focussed on achieving a target path for nonborrowed reserves thought to be consistent with the desired growth of the monetary aggregates; a target range for the federal funds rate continued to be specified but was made much wider and was no longer regarded as binding.

In order to calculate the appropriate path for nonborrowed reserves, the Federal Reserve first estimated the desired path for total reserves based on (i) FOMC objectives for growth of M-1 and M-2, (ii) estimates of the average reserve requirements on deposit liabilities, and (iii) estimates of currency holdings and excess reserves. The path for nonborrowed reserves was then derived by subtracting an assumed level of borrowed reserves (often set near the average level prevailing just before the FOMC meeting) from the total reserve path.

Under the nonborrowed reserve targeting procedure, there was an automatic mechanism that served to dampen deviations in the growth of the monetary aggregates from target. If the demand for money exceeded the targeted growth rate, this would raise banks' demand for reserves and spur more intensive efforts to obtain resources in the market for federal funds, thereby tending to bid up the federal funds rate. This would exert upward pressure on all short-term interest rates, and,

This automatic mechanism would not be expected to completely offset deviations of monetary growth from target, as banks could also obtain additional reserves by borrowing at the Federal Reserve discount window. If borrowed reserves were maintained at an unexpectedly high level, total reserves would tend to be above levels anticipated at the FOMC meeting, hence permitting a higher level of money supply. At the discretion of the Federal Reserve, such a result could be avoided by discouraging discount window borrowing (either by raising the discount rate or by moral suasion) or by reducing the targeted supply of nonborrowed reserves; both actions would exert further upward pressure on interest rates. In general, the Federal Reserve would resort to such discretionary action when the deviation of reserves from target appeared to reflect more than a transitory movement in the demand for money.

Extremely wide fluctuations in interest rates were experienced under these operating procedures. These fluctuations were due in part to the imposition and removal of credit controls in the first part of 1980 and to wide swings in economic activity; they also apparently reflected the Federal Reserve's willingness to accept large changes in interest rates as a cost of achieving a reduction in inflation.

4. Targeting on borrowed reserves

In October 1982, the FOMC decided to move away from conducting policy on the basis of a target path for nonborrowed reserves toward a more judgemental approach based on targeting on borrowed reserves. This decision was taken at a time when inflation had come down sharply to relatively low levels while U.S. economic activity was weak and there were serious concerns about the debt-financing capacity of numerous developing countries. In this context, the goal of reducing inflation was no longer regarded as the over-riding objective of monetary policy. Moreover, there were mounting uncertainties about the behavior of the aggregates. M-1, in particular, seemed to be affected by a rise in liquidity preference fostered by concerns about the economy, by the maturing of a large volume of all-savers certificates in the fall of 1982, and by anticipation of the introduction of money market deposit accounts and super-NOW accounts at the end of the year. In these circumstances, the emphasis placed on M-1 was reduced, while the behavior of all the aggregates was to be appraised against the background of developments in the economy and financial markets, as well as the outlook for inflation. In this situation, operating procedures designed to facilitate close control over movements of the narrow monetary aggregate seemed less appropriate than more flexible procedures.

Under the new procedures, the FOMC states its objectives for open market operations in terms of degrees of reserve restraint. These instructions are generally interpreted in terms of the average level of seasonal plus adjustment borrowing at the Federal Reserve discount

window over the intermeeting period.^{1/} Extended credit from the Federal Reserve to banks experiencing sustained liquidity pressures is not counted as borrowing in this context; unlike seasonal and adjustment borrowing, the Federal Reserve does not require such credit to be repaid promptly. For this reason, extended credit is treated by the Federal Reserve as part of nonborrowed reserves for the purposes of policy implementation.

Under the new procedures, a greater degree of reserve restraint would correspond to a higher level of borrowing. This result would be achieved through open market operations to withdraw nonborrowed reserves from the financial system, which would exert upward pressure on the federal funds rate and hence encourage banks to turn to the discount window. Similarly, a lesser degree of reserve restraint would be achieved by supplying reserves through open market operations, which would tend to reduce banks' recourse to the discount window.

In implementing policy under these procedures, the Federal Reserve first calculates a path for total reserves consistent with the target path for the money supply and an assumed level of excess reserves, and then deducts the intended level of borrowing from the total reserve path to obtain an initial path for nonborrowed reserves to be supplied to the system. During the intermeeting period, to the extent that money and reserve demand deviate from the projections set at the FOMC meeting, the path for nonborrowed reserves is generally adjusted to attain the intended level of borrowing. However, the FOMC directive to the Open Market Desk may contain instructions to raise or lower the degree of tightness of reserve provision under specified circumstances. In practice, these conditions have typically been expressed in terms of deviation of monetary growth from rates expected at the time of the FOMC meeting, taking into account factors such as the strength of economic activity, the extent of inflationary pressures, and conditions in domestic and international credit markets.

The new procedures differ from those followed in 1979-82 in that, at least initially, nonborrowed reserves rather than borrowed reserves adjust during the intermeeting period to allow for unforeseen movements in demand for reserves. For example, under the new procedures, an unforeseen rise in reserve demand would be accommodated by open market sales to increase the supply of reserves, rather than being automatically

^{1/} Adjustment borrowings are short-term loans extended by the Federal Reserve to depository institutions to assist such institutions to adjust reserves to required levels; most institutions repay such borrowings within a few days. Seasonal borrowings are longer-term loans to depository institutions that have relatively strong seasonal patterns in their deposits or loan demand. Both types of borrowing are positively related to the gap between the federal funds rate and the discount rate; the larger this gap, the greater is the incentive for banks to satisfy their need for reserves through the discount window rather than in the federal funds market.

offset by a rise in the federal funds rate. Action is taken to offset deviations of money and reserve growth from projections anticipated at the FOMC meeting only if the judgement is made that the degree of reserve provision is inappropriate in terms of the broader objectives of the Federal Reserve.

This discretionary approach to the implementation of monetary policy followed since late 1982 is similar in many respects to the procedure used before October 1979 of targeting on the federal funds rate. Under both procedures, unexpected increases in the demand for reserves are accommodated by the supply of additional nonborrowed reserves, rather than partially offset in an automatic fashion by increases in the federal funds rate; both procedures allow for a discretionary response in the event of a sustained deviation in the path of the money supply from target. However, under the current procedures, the band for the federal funds rate is much wider than under the pre-October 1979 procedure, and a range of values of the federal funds rate may be compatible with a given level of borrowed reserves. Under targeting on borrowed reserves, a change in the underlying real interest rate--for example, due to a change in the outlook for the fiscal position--or in the expected inflation rate would be allowed to affect the level of short-term interest rates (including the federal funds rate); under targeting on the federal funds rate, the effects of such shifts would be largely offset by open market operations aimed at keeping the federal funds rate unchanged.

It may also be noted that under targeting on borrowed reserves, a change in the Federal Reserve's discount rate would tend to have an effect on the overall level of market interest rates. For example, if the Federal Reserve lowered the discount rate, this action would tend to raise the demand for borrowed funds at given market interest rates. To maintain borrowing at the targeted level, the Federal Reserve would need to supply nonborrowed reserves to the market; this action would serve to lower short-term interest rates, including the federal funds rate, and thus reduce demand for borrowed reserves back to the Federal Reserve's target.

5. Comparison of results under alternative operating procedures

This section compares the volatility of various financial indicators under the three alternative operating procedures. It also compares the extent to which actual growth of the monetary aggregates matched the Federal Reserve's objectives during the periods corresponding to each of the procedures. It should be emphasized at the outset that the differences between outcomes in the three periods cannot be ascribed solely to the differences in operating procedures; such differences may also have been due to variations over time in the volatility of economic activity and inflation and the effect of financial innovations.

In the absence of other disturbances, one might expect that the switch in procedures from targeting on the federal funds rate to targeting on nonborrowed reserves would be accompanied by an increase in the

volatility of the federal funds rate but a reduction in the volatility of the growth of bank reserves and of M-1. The subsequent switch to procedures emphasizing a borrowed reserve target might be expected to have reduced the volatility of the federal funds rate below that in the previous period although such volatility would still be higher than in the period of targeting on the federal funds rate. At the same time, the volatility of growth in reserves and M-1 would be increased above that in the period of targeting on nonborrowed reserves but would still be less than in the period before October 1979.

The tabulation below shows how the volatility of selected financial indicators has evolved over the three policy periods. Four variables are chosen: the federal funds rate; the level of borrowed reserves (excluding extended credit from the Federal Reserve); the growth of nonborrowed reserves (including extended credit from the Federal Reserve); the growth of total reserves; and the growth of M-1. Volatility is measured as the standard deviation of the variable in question. In an attempt to remove the effects of two substantial shocks to the system, the period March-June 1980 (in which credit controls were imposed and then removed) and May-June 1984 (in which a major commercial bank experienced severe liquidity problems) were eliminated from the data.

Volatility of Selected Financial Indicators Under
Alternative Operating Procedures

(Standard deviation of month-to-month
percentage change in variable)^{1/}

	Federal Funds Rate	Nonborrowed Reserves ^{2/}	Borrowed Reserves ^{3/}	Total Re- serves	M-1
Targeting on the Federal Funds Rate (1975:2 to 1979:9)	2.01	1.07	0.49	0.73	0.37
Targeting on Non- borrowed Reserves (1979:10 to 1982:9) ^{4/}	5.21	1.05	0.62	0.78	0.66
Targeting on Borrowed Reserves (1982:10 to 1985:5) ^{5/}	2.41	0.96	0.28	0.75	0.46

^{1/} In the case of the federal funds rate and borrowed reserves, volatility is expressed as the standard deviation of the level of the variable.

^{2/} Includes extended credit from Federal Reserve.

^{3/} Excludes extended credit from Federal Reserve.

^{4/} Excludes 1980:3 to 1980:6.

^{5/} Excludes 1984:5 to 1984:6.

The tabulation indicates that the switch from targeting on the federal funds rate to targeting on nonborrowed reserves was accompanied, as expected, by a sizable increase in the volatility of the federal funds rate; interest rate volatility declined in the period of targeting on borrowed reserves. However, the volatility of growth of M-1 increased substantially in the period of targeting on nonborrowed reserves while the volatility of the reserve indicators did not change significantly. Moreover, following the subsequent shift to targeting on borrowed reserves, the volatility of the growth of M-1 has dropped substantially. These results are not in line with expectations, and suggest that the period of targeting on nonborrowed reserves may have been a period in which disturbances to the financial system were considerably larger than usual.

Alternative operating procedures can also be compared by looking at the deviation of actual monetary growth from the target range announced at the beginning of the year. One would expect that operating procedures focussing directly on control of reserves would provide a more effective framework to achieve monetary objectives. The tabulation below shows the average deviation of growth of each of the aggregates from the mid-points of their respective targets, as announced by the Federal Reserve in February, for each operating procedure.^{1/} It should be noted that the Federal Reserve's announced targets were revised during the year in 1975-79 and again in 1983; for the purposes of the present analysis, however, such changes were disregarded to allow uniform treatment across different policy regimes.

Average Deviation of Actual Money Growth from Target

(In percentage points per annum)

	<u>M-1</u>	<u>M-2</u>	<u>M-3</u>
Targeting on federal funds rate (1975:IV to 1979:IV)	1.2	1.5	1.3
Targeting on nonborrowed reserves (1979:IV to 1982:IV)	1.3	1.9	2.6
Targeting on borrowed reserves (1982:IV to 1985:II)	2.5	0.3	1.6

As shown in the tabulation, average monetary growth exceeded the target for each of the monetary aggregates while each of the three operating regimes were in effect. If anything, the difference between actual outcome and intention at the beginning of the year was greater

^{1/} The deviation is defined as actual monetary growth less the mid-point of the target range for growth of the aggregate.

in the periods of targeting on nonborrowed and borrowed reserves than it had been in the period of targeting on the federal funds rate. However, financial innovations and other special factors have boosted the demand for money in several recent years, particularly in 1982 and 1983, by more than was initially anticipated by the Federal Reserve; the excess of actual monetary growth over target in these years reflected at least in part adjustment by the Federal Reserve to such shifts in the demand for money. For this reason, it is difficult to draw firm conclusions from these data about the degree to which the different operating procedures provided a more or less effective framework to attain the Federal Reserve's monetary targets.



INTERNATIONAL MONETARY FUND
WASHINGTON, D. C. 20431

CABLE ADDRESS
INTERFUND

August 9, 1985

Dear Charles:

You may be interested in having a preliminary copy of this paper which will be coming out in the DM series. It is an attempt at establishing a relationship between fiscal deficits and interest rates in the United States. In particular, you may be interested in reading the conclusions on pp. 23-24. In short, the paper shows (a) that the fiscal deficit did have an impact on interest rates in the United States in recent years; however (b) much of the increase in real rates that took place was due to factors other than the fiscal deficit. These other factors seem to have been much more important than the fiscal deficit itself.

Should anyone at the Treasury have any reaction, I would appreciate receiving it.

Regards,

Vito

Vito Tanzi

Enclosure

Mr. Charles H. Dallara
Room 13-320

1. The first part of the paper discusses the importance of maintaining accurate records of all transactions. This is essential for the proper management of the company's finances and for ensuring that all stakeholders are kept informed of the company's financial health.

2. The second part of the paper discusses the importance of maintaining accurate records of all transactions. This is essential for the proper management of the company's finances and for ensuring that all stakeholders are kept informed of the company's financial health.

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4. The fourth part of the paper discusses the importance of maintaining accurate records of all transactions. This is essential for the proper management of the company's finances and for ensuring that all stakeholders are kept informed of the company's financial health.

5. The fifth part of the paper discusses the importance of maintaining accurate records of all transactions. This is essential for the proper management of the company's finances and for ensuring that all stakeholders are kept informed of the company's financial health.



Any views expressed in the Departmental Memoranda (DM) Series represent the opinions of the authors and, unless otherwise indicated, should not be interpreted as official Fund views.

DM/85/46

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

Fiscal Deficits and Interest Rates in the United States:
An Empirical Analysis, 1960-84

Prepared by Vito Tanzi*

August 12, 1985

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Fiscal Deficits and Interest Rates in the United States:
An Empirical Analysis, 1960-84

by Vito Tanzi

Few relationships in economics have attracted as much attention as that between the U.S. fiscal deficit and U.S. interest rates. A large and growing number of theoretical and empirical papers have recently analyzed such a relationship and financial analysts as well as politicians often refer to it. Some economists have attributed the historically high real rates since 1981 to the fiscal policy pursued by the United States in recent years. Others have denied the role of such a policy. This paper adds to that literature by analyzing on a mostly empirical basis the relationship between interest rates and several variables presumed to influence them, including fiscal variables.

The paper is structured as follows. Section I discusses briefly the major theoretical arguments that have been advanced in support of the conclusion that fiscal deficits do not affect interest rates. As the conclusion that fiscal deficits do affect interest rates is fairly orthodox, no space is allocated to the arguments behind it. As the aim of this paper is to analyze empirically the relationship between interest rates and fiscal variables, this theoretical section is short and somewhat impressionistic. It is neither a survey of the vast literature, nor a rigorous treatment of the issues discussed. The busy reader can skip it. Section II describes the series used in the statistical analysis so that, in Section III, the empirical results can be presented without at the same time having to discuss the data. It also outlines the structural equations to be tested. Section III is the core of the paper. Section IV summarizes the main results and draws some conclusions. The period covered in the analysis is 1960 to 1984. For reasons explained later the 1960-80 and the 1960-84 periods are analyzed separately.

I. Theoretical Considerations

The fiscal deficit can increase either (a) because government expenditure rises while revenue remains unchanged, or (b) because tax revenue falls while government expenditure stays unchanged, or (c) because tax revenue falls while government expenditure rises. Regardless of which of these three cases is behind the increase in the fiscal deficit, government bond sales will have to increase. *Ceteris paribus*, in order to induce people to buy a larger quantity of bonds than previously, the government must discount them somewhat. Putting it differently, interest rates must rise from the level that they would have reached in the absence of the deficit.

The above conclusion follows from the most fundamental law in economics, namely, the law of demand. That law tells us that if one wants to sell more of something, one has to reduce its price. This result should not be, thus, controversial. Still this is not the case as lots of controversy exists as to whether or not fiscal deficits bring about increases in interest rates. What is the source of this controversy? Stripped to the bare essentials, the lines of criticism against the orthodox conclusion stated above are basically two. First, there is the assumption of spontaneous compensating behavior on the part of the private sector. ^{1/} Second, there is the assumption that the elasticity of the supply of funds schedule facing the sale of government bonds is high or even perfectly elastic. Let us discuss briefly these two lines of criticism.

1. Compensating behavior

Compensating behavior may be related either to the behavior of the corporate sector or to the behavior of the household sector. Suppose, for example, that as the government increases its expenditure, private investment falls. If there is a dollar per dollar trade-off between the rise in deficits and the fall in private investment, it is conceivable then that the rate of interest could remain unchanged. To a large extent this happened during World Wars I and II when the large increase in government expenditure was partly met by tax increases, partly by an increase in household saving, and, to a large part, by a sharp fall in private investment. ^{2/} Of course, the fall in private investment must

^{1/} In other words, of a compensating behavior not induced by the increase in interest rates.

^{2/} As a proportion of GNP, gross private domestic investment fell from an average of 15.7 percent in 1912-16 to 12.3 percent in 1917, and 9.1 in 1918. It fell from 12.7 percent in 1940-41 to 6.3 percent in 1942, 2.8 percent in 1943, and 3.3 percent in 1944. See U.S. Department of Commerce, Long Trend Economic Growth, 1860-1965 (Washington, October 1966), pp. 166-71. During these periods interest rates were also directly or indirectly controlled. For more detail see Vito Tanzi, "Do Large Deficits Produce High Interest Rates? A Comment" (mimeographed, April 1985).

not itself be caused by the increase in the rate of interest but it could be caused by changes in expectations or by direct prohibition (on the part of the government) of some activities.

The accommodating behavior on the part of the household factor could come in different ways. If, for example, the deficit is caused by a decrease in taxes and this decrease in taxes is seen as temporary by the taxpayers, it is conceivable that the additional disposable income received by the taxpayers could be largely saved and utilized to purchase the bonds that the government is selling. The requirement for this behavior is the permanent income hypothesis of consumption behavior. Alternatively, as argued by Barro, 1/ if the household sector has perfect foresight it would realize that the public debt being created now must be repaid at some future date so that in time taxes would have to go up. Or, putting it differently, the household sector would realize that government bonds are not net wealth so that holding more of them will not make taxpayers richer and thus induce them to consume more. In such case they would presumably save the income associated with the tax cut. This so-called Ricardian Equivalence Hypothesis, thus implicitly assumes that there are no permanent tax cuts regardless of the declaration of the government. It must also assume that no tax cuts are ever self-financing as argued by Arthur Laffer and some supply-siders.

If deficits are associated with tax cuts, households can go on maintaining the same level of consumption as before and still increase their saving rate as their disposable income has increased. The increase in their disposable income makes it easier for them to increase their saving rate. If the increase in the deficit is not associated with a tax cut but with an increase in government expenditure, then the behavior à la Barro seems far less likely. 2/ In such case the households would, actually, have to cut their present level of consumption to behave à la Barro. Presumably ratchet effects would make this difficult at least in

1/ Robert J. Barro, "Are Government Bonds Net Wealth?" Journal of Political Economy (Chicago), Vol. 82 (November/December 1974), pp. 1095-1117.

2/ This, presumably, is the assumption behind the belief on the part of some economists that interest rates are not influenced by fiscal deficits but by the level of public expenditure. To be fair to Barro, his specific analysis in the 1974 article relates only to shifts between tax and debt finance for a given volume of public expenditures. However, his analysis has been applied to real life situations where it was expenditures that went up. See for example the various studies that cover the post-World War II period.

the short run. 1/ Furthermore, there is no valid reason why households, even if they had perfect foresight, should not see the increased level of spending as temporary and, thus, not requiring a drastic change in their consumption behavior. In this case, the rate of interest would have to go up and some investment expenditure, including the purchase of durables on the part of the households, would have to be crowded out by higher interest rates to accommodate the higher deficit. Even when the deficit is caused by tax reductions--the case more favorable for a behavior à la Barro--the requirements behind a reaction consistent with a Ricardian Equivalence Hypothesis are so stringent that many have difficulties in accepting them. A full discussion of this aspect would require far more space than can be allocated here. 2/

1/ During both World Wars I and II households did not have to reduce the absolute level of their consumption because when the war started, there was a lot of unused capacity in the economy. The additional government spending could be accommodated largely through an expansion of output. Real consumption actually rose during both World Wars I and II, even though its share of GNP fell considerably. See Tanzi, "Do Large Deficits Produce High Interest Rates? A Comment," for more details on this aspect.

2/ There is now an enormous amount of literature on the Ricardian Equivalence Hypothesis. Although this hypothesis has become fashionable since the publication of Barro's paper, it received a lot of attention in the Italian public finance literature earlier in this century. Pareto, among others, dismissed it as an unrealistic possibility. See on this, James M. Buchanan, "Barro on the Ricardian Equivalence Theorem," Journal of Political Economy (Chicago), Vol. 84 (April 1976), pp. 337-42. Two recent papers that have rejected it are: F. Modigliani, T. Jappelli, and M. Pagano, "The Impact of Fiscal Policy and Inflation on National Saving: The Italian Case" (mimeographed: revised April 1985); and Michael J. Boskin and Laurence J. Kotlikoff, "Public Debt and U.S. Saving: A New Test of the Neutrality Hypothesis" (mimeographed: Carnegie-Rochester Conference, November 1984). For earlier criticism see James Tobin and William H. Buiter, "Fiscal and Monetary Policies, Capital Formation and Economic Activity," in The Government and Capital Formation, ed. by G. M. von Furstenberg (Cambridge, Massachusetts: Ballinger, 1980). There are also several studies that claim to have found support for that hypothesis. See, in particular, articles by R. C. Kormendi, "Government Debt, Government Spending, and Private Sector Behavior," The American Economic Review (Nashville), Vol. 73 (December 1983), pp. 994-1010; and by David Alan Aschauer, "Fiscal Policy and Aggregate Demand," The American Economic Review (Nashville), Vol. 75 (March 1985), pp. 117-27.

2. Supply of funds elasticity

The issue here is not whether the rate of interest must increase when the government attempts to increase its sale of bonds, but how much. If the government faced a perfectly elastic supply of funds schedule, the rate of interest would not rise. We shall distinguish two alternative versions of this issue, a domestic one and an international one.

a. Domestic supply of funds schedule

Several economists have called attention to the fact that the fiscal deficit, at 4-5 percent of gross national product, is still a very small fraction (say, one or two percent) of the total wealth of the United States. Therefore, a small reallocation in the portfolios of households, they argue, can absorb the additional public bonds which finance the deficit. ^{1/} As the American capital market is very efficient, this reallocation can be brought about by a very small increase in the interest rate. This is a clever argument that would have a lot of validity in a frictionless world. Unfortunately, the real world is not like that.

The main shortcoming of this argument is its lack of recognition of the fact that when an individual converts one type of asset (say, stocks, buildings, land, durables, etc.) into another (say, government bonds) he often faces substantial transaction costs. Some of these may be commissions to be paid to brokers, real estate agents, and the like. Others may be taxes that arise out of those shifts (income taxes on realized capital gains, transfer taxes, etc.). As a consequence of these costs, the supply of funds schedule that the government faces at any moment is upward sloping and the slope increases the more the government tries to borrow. These costs are obviously very small when bonds are purchased out of current net saving. This may be an important reason why the deficit is likely to have less of an effect on interest rates in countries, such as Japan, where the rate of saving is high.

b. International supply of funds schedule

A country does not face just its domestic supply of funds but also an international one. In a recent paper the author has emphasized the international character of the capital market and has pointed out that in today's world the interest rate is likely to be determined by the

^{1/} See Edmund S. Phelps, "The Real Interest Rate Quiz," Atlantic Economic Journal (Worden, Illinois), Vol. 13 (March 1985), pp. 1-4; John Rutledge, "What Lower Yield on Tangibles Means," Wall Street Journal (New York), January 20, 1982 (Vol. CXCIX, No. 15), p. 23.

intersection of international supply and demand schedules. 1/ Let me quote from that paper:

The U.S. demand for credit, whether originating in the public or in the business sector, can be met by the U.S. supply of credit as well as by the rest of the world's supply of credit. But, obviously, the U.S. demand for credit must compete against the rest of the world's demand for credit. If the U.S. demand rises because of a higher fiscal deficit at a time when the rest of the world's demand falls, interest rates need not rise. Mutatis mutandis, given the U.S. demand for credit, an increase in net investment or in fiscal deficits in Europe or Japan is likely to cause U.S. as well as foreign interest rates to rise. 2/

Thus, if an increase in the fiscal deficit in the United States leads to a rise in the rate of interest, this rise will attract capital from abroad. This capital inflow will moderate the rise in the rate of interest. This, many argue, is what has happened in recent years. Without the large capital inflows interest rates in the United States would probably have increased more than they did. In this context the size of the country is important. The U.S. economy is so large that it takes a substantial proportion of foreign savings to finance its deficit. 3/ In this case too the (foreign) supply of funds schedule is likely to be upward sloping. As the share of dollar-denominated bonds in the foreign portfolios increase, foreigners are likely to demand higher rates of return to keep investing in U.S. bonds. 4/

1/ See Vito Tanzi, "The Deficit Experience in Industrial Countries," in The Economy in Deficit, Essays in Contemporary Economic Problems, ed. by Phillip Cagan (Washington: American Enterprise Institute, 1985), pp. 81-119.

2/ Ibid., p. 104.

3/ It has been estimated that in 1983 the deficit of the federal government of the United States was equivalent to 35.5 percent of the net personal savings of the G-7 countries. See Tanzi, *ibid.*, p. 109.

4/ See on this Stephen N. Marris, "The Decline and Fall of the Dollar: Some Policy Items," Brookings Papers on Economic Activity: 1 (1985), The Brookings Institution (Washington), pp. 237-44.

II. Description of Data and Tests to be Performed

1. Description of data

In all the equations presented in Section III the dependent variable is the rate of interest on U.S. Treasury bills. The tables reporting the estimated regression equations will all refer to Treasury bills of one-year maturity. However, a brief reference will also be made to results related to bills of different maturity although the equations will not be shown for these other maturities.

The independent variables will be the following. First, a measure of inflationary expectations covering the same period as the Treasury bills will be utilized. The one used is the Livingston index, which is based on observed inflationary expectations derived from surveys conducted every six months. ^{1/} It is based on data collected over many years by Joseph A. Livingston, a financial reporter, and published, for the 1948-71 period, in the Philadelphia Sunday Bulletin and, after 1971, in the Philadelphia Inquirer. More recently these data have been collected by the Federal Reserve Bank of Philadelphia. The Livingston index is the most commonly used in empirical work related to inflationary expectations. The responses of a sample of economists and other knowledgeable financial observers as to the rate of inflation that they expect over future periods of six months, one year, and 18 months are collected and averaged. As the paper deals with Treasury bills of one-year maturity, one year expectations will be utilized.

The second nonfiscal variable used aims at measuring the level of economic activity at a given time. This variable will be called the gap and is defined as follows:

$$\text{Gap} = \frac{\text{Actual GNP}_t - \text{Potential GNP}_t}{\text{Potential GNP}_t} \cdot 100$$

This index, measured in percentage terms, is negative during recessions, when actual GNP falls below potential GNP, and positive during booms, when the reverse occurs. When the economy is on its long-term trend, the gap becomes zero. Actual GNP has been obtained from official published sources. Data for potential GNP were prepared in past years by the Council of Economic Advisors. The series has been recently updated by the Congressional Budget Office as the Council discontinued its preparation.

^{1/} For a detailed description of this index see J. A. Carlson, "A Study of Price Forecasts," Annals of Economic and Social Measurement (New York), Vol. 1 (June 1977), pp. 27-52.

In addition to the two independent variables reported above, the empirical analysis also utilizes three fiscal measures--two related to the deficit and one related to the public debt. In all cases these measures are expressed as percentages of gross national product. Both measures of the deficit are related to the federal budget and thus ignore the balances of state and local governments. The first measure of the fiscal deficit is the federal unified budget measure. It is on a cash basis rather than on an accrual basis, unlike the concept that one would find in the national accounts. A cash concept is considered more pertinent for an analysis of interest rates. The other measure of the deficit is a federal cyclically adjusted one. The series used was prepared by Frank de Leeuw and Thomas M. Holloway of the U.S. Department of Commerce and is based on a mid-cycle expansion trend. The measurement of this cyclically adjusted deficit requires several steps. 1/ First, a trend for GNP must be chosen. Second, the sensitivity of receipts and expenditures to short-run movements in GNP must be estimated. Third, on the basis of these sensitivities the effects of economic activity gaps on receipts and expenditures must be determined. Fourth, the actual budget must be adjusted for the effects estimated in the third step. As de Leeuw and Holloway point out, the first step is the most controversial. Finally, we shall also use the ratio of public debt held by the public to GNP. The series used was taken from the Budget of the United States Government - Special Analyses (1985). For this measure de Leeuw and Holloway have provided a cyclically adjusted measure which will also be used.

For quick reference Table 1 lists the symbols utilized to identify the variables throughout the paper.

2. Description of Tests

In an earlier paper the author outlined and tested some basic relationships between interest rates and two important independent variables, 2/ namely, inflationary expectations and economic activity. 3/

1/ The measure is described and reported in Frank de Leeuw and Thomas M. Holloway, "Cyclical Adjustment of the Federal Budget and Federal Debt," Survey of Current Business (Washington: U.S. Department of Commerce), Vol. 63 (No. 12, December 1983), pp. 25-40. See also by the same authors "The Measurement and Significance of the Cyclically Adjusted Federal Budget and Debt," Journal of Money, Credit and Banking, Volume XVII (No. 2, May 1985), pp. 232-42.

2/ See Vito Tanzi, "Inflationary Expectations, Economic Activity, Taxes, and Interest Rates," The American Economic Review (Nashville), Vol. 70 (No. 1, March 1980), pp. 12-21.

3/ The role of taxes in interest rates determination was also discussed.

Table 1

Key to Symbols Used

R	= interest rates on Treasury bills.
G	= a measure of economic activity called the gap.
π	= the Livingston index of inflationary expectations.
DU	= unified budget fiscal deficit as a share of GNP.
DL	= cyclically adjusted fiscal deficit as a share of trend GNP.
Debt	= ratio of public debt held by the public to GNP.
V	= a dummy equal to zero for the 1960-80 period and equal to one for the 1981-84 period.

The Fisherian theory that predicts that, in an inflationary environment, interest rates will tend to change *pari passu* with changes in inflationary expectations, was amended to take account of the possibility that real interest rates may change over the cycle in response to fluctuations in the level of economic activity. The equation that was estimated was thus:

$$(1) \quad R_t = a + b\pi_t + cG_t$$

where R_t is the nominal rate of interest for an instrument of a given maturity, π_t represents the inflationary expectation over that same maturity period, and G_t is the gap reflecting economic activity over some relevant period. The equation states that when the gap is zero, and thus the economy is moving on its long-run growth path, the nominal rate of interest tends to change in line with Fisher's hypothesis. However, during the period of expansion, $\Delta G_t > 0$ the nominal rate of interest increases by more than the change in the value of π_t . This means that, in such case, the expected real rate of interest (measured as $R_t - \pi_t$) tends to rise. The reverse occurs during periods of recession, when $\Delta G_t < 0$. The theory behind equation (1) recognized that the demand for funds and the real rate of return that lenders expect to receive on their loans tends to vary over the business cycle.

In the 1980 paper, equation (1) was tested with data extending to 1975. The dependent variable was alternatively six- and twelve-month 2 Treasury bills. The statistical results obtained were quite good. The R_s exceeded 0.60, the Durbin-Watson statistics were close to two, and the coefficients of π were not significantly different from one, as expected from Fisher's. The most important result, however, related to the variable reflecting economic activity. The paper provided some theoretical reasons as well as, for the first time, strong statistical support for the hypothesis that real interest rates are indeed affected by economic activity. Furthermore, this effect was large and not just significant. The expected real rate was shown to rise by about one percentage point for every four percentage point increase in the size of the gap. Thus over the cycle interest rates could easily vary by perhaps as much as two percentage points in a *ceteris paribus* situation.

When fiscal variables do not play a role in determining the demand for funds, say when the budget is balanced, equation (1) would tell us much about the factors that influence the level of interest rates. However, as we saw in Section I, there are some good reasons why the size of the deficit and possibly the level of the public debt could also play a role. As far as the deficit is concerned this role is rather obvious: if the government is trying to increase its demand for funds by selling bonds, this additional demand should put pressure on interest rates unless there is some countervailing effect elsewhere or unless

the rest of the world can accommodate that demand without any rise in the rates. Such a countervailing effect could, for example, be that associated with a behavior consistent with the Ricardian Equivalence Hypothesis. Or it could be associated with a decline in private investment not caused by the increase in interest rates.

As far as public debt is concerned the case for its inclusion among the independent variables is less obvious. One could assume, for example, that as the portfolios of individuals come to be laden with government bonds, and as debt is progressively diverted away from financing capital accumulation in the private sector, the rate of return in the latter would have to increase. ^{1/} This increase would in turn affect interest rates. Thus, perhaps both of these variables (fiscal deficit and public debt) should be considered in the determination of interest rates. However, this alternative introduces some statistical problems as the fiscal deficit and public debt are likely to be correlated. Equation (1) will be re-estimated adding the fiscal variables mentioned above. In addition to equation (1), the equations that will be estimated are the following:

$$R_t = a + b\pi_t + c G_t + d DU_t$$

$$R_t = a + b\pi_t + c G_t + d DL_t$$

$$R_t = a + b\pi_t + c G_t + d Debt_t$$

$$R_t = a + b\pi_t + c G_t + d DU_t + e Debt_t$$

$$R_t = a + b\pi_t + c G_t + d DL_t + e Debt_t$$

These equations should be considered as reduced forms of a structural model that has not been fully outlined in the paper.

^{1/} As Benjamin M. Friedman has shown, the ratio of total debt (public and private) to gross national product has been relatively stable for a long time in the United States. See his paper, "Debt and Economic Activity in the United States," in The Changing Roles of Debt and Equity in Financing U.S. Capital Formation, ed. by Benjamin M. Friedman (Chicago: University of Chicago Press, 1982).

III. Statistical Results

1. The 1960-80 period

As a first step in our analysis we shall re-estimate equation (1), extending the period beyond 1975. For reasons that will become clear later, we deal first with the period up to 1980 and then with the period up to 1984. Equation (1) has been re-estimated for the 1960-80 period. The results are shown as equation (2) in Table 2. ^{1/} Statistically, equation (2) is very good with an $\bar{R}^2 = 0.84$ and a D.W. of 2.02. The coefficients of the independent variables π and G also have the right signs and are significant at the 1 percent level. Furthermore, as required by the Fisher hypothesis, ^{2/} the coefficient of π is not significantly different from one. The coefficient of the economic activity variable, G , is even larger than in the 1980 study confirming that this variable should not be omitted in empirical studies that analyze the determinants of interest rates.

Equations (3) through (7) in Table 2 show the results for the 1960-80 period when the various fiscal variables are added. Equation (3) adds the unified budget deficit. The result is a bit disappointing. First, both the $\bar{R}^2$ and the Durbin-Watson statistic fall as compared to equation (2). Second, even though the deficit is significant (at the 5 percent level) and has the right sign, its inclusion renders insignificant the economic activity variable. Nothing is gained in terms of explanatory power by the addition of the deficit. This result, however, can be explained by the realization that there is a strong cyclical element in the unified budget deficit used in equation (3). When the economy is expanding, especially when there is some inflation and the tax system is not indexed so that its elasticity exceeds one, revenue rises faster than GNP, and public expenditure tends to lag behind revenue. Thus the deficit falls. The reverse happens during a slowdown. This means that the deficit tends to move with the cycle and thus tends to be correlated with the gap which also moves with the cycle. A correlation matrix between the independent variables shown in Table 2 indicated a significant correlation between the unified budget deficit and the gap. For the 1960-80 period the correlation coefficient was 0.52, significant at the 5 percent level. There was no significant correlation between the gap and the other fiscal variables used in Table 2.

^{1/} The dependent variable in all the equations in Table 2 and the following tables is one-year Treasury bills.

^{2/} This is the traditional hypothesis that ignores the potential effect of taxes.

Table 2

Regressions for the 1960-80 Period

(2)	$2.797 + 0.897\pi_t + 0.287G_t$ (6.119)** (8.553)** (3.230)**	$\bar{R}^2 = 0.840$ D.W. = 2.020
(3)	$3.219 + 0.944\pi_t + 0.095G_t + 0.655DU_t$ (9.502)** (9.403)** (1.261) (2.849)*	$\bar{R}^2 = 0.835$ D.W. = 1.756
(4)	$3.747 + 0.994\pi_t + 0.297G_t + 0.839DL_t$ (10.841)** (10.317)** (4.333)** (3.571)**	$\bar{R}^2 = 0.861$ D.W. = 1.959
(5)	$-1.605 + 1.127\pi_t + 0.349G_t + 0.109Debt_t$ (0.796) (8.034)** (4.214)** (2.244)*	$\bar{R}^2 = 0.870$ D.W. = 1.969
(6)	$-2.083 + 1.260\pi_t + 0.250G_t + 0.475DU_t + 0.122Debt_t$ (1.181) (9.463)** (3.024)** (2.488)* (2.862)**	$\bar{R}^2 = 0.901$ D.W. = 1.839
(7)	$-0.983 + 1.258\pi_t + 0.375G_t + 0.747DL_t + 0.112Debt_t$ (0.614) (10.613)** (6.029)** (3.811)** (3.000)**	$\bar{R}^2 = 0.905$ D.W. = 1.959

Notes: (1) In this table as well as in the following tables two stars indicate significance at 1 percent level and one star indicates significance at 5 percent level.

(2) Equations (2), (5), and (6) have been corrected for serial correlation using a first-order Cochrane-Orcutt correction.

Equation (4) deals with the problem affecting equation (3) by replacing the (unadjusted) unified budget measure of the deficit by the cyclically adjusted measure. Equation (4) represents a noticeable improvement over both equations (2) and (3). The $\bar{R}^2$ rises to over 0.86, and the D.W. statistic, without any adjustment of the error term for serial correlation, is close to two. All the coefficients of the independent variables are significant at the 1 percent level. The coefficient of π is now very close to one. Equation (4) is indeed a good equation; it provides some support for the hypothesis that the deficit has an impact on interest rates. On the basis of that equation one would conclude that, ceteris paribus, during the 1960-80 period a cyclically adjusted deficit of 5 percent of GNP would have raised the rate of interest by about four percentage points. 1/

Equation (5) follows a different route. Suppose that the impact of fiscal policy on interest rates comes through its effect on the public debt and not necessarily through its effect on the deficit. Then one would want to include a debt variable. Equation (5) uses the ratio of the debt held by the public to GNP. The $\bar{R}^2$ is now even higher than in equation (4) ($\bar{R}^2 = 0.87$) and the D.W. statistic is also very good. However, the equation has been corrected for serial correlation and the constant term has become insignificant. The debt variable is significant (at the 5 percent level) and the coefficient of π now rises above one. 2/ One of the changes the debt variable brings to the equation is to turn the constant term from about 3 to a negative value which is statistically insignificant.

Equations (6) and (7) are combinations of equations (4) and (5) in the sense that both the deficit and the debt are entered as independent variables. In these equations the $\bar{R}^2$ are over 0.90 while the D.W. statistic is still very good. 3/ All the coefficients are significant and those in equation (7) are significant at the 1 percent level. The coefficients of π are now well above one. This result might be seen as providing support for the tax-adjusted Fisher theory, which requires that when taxes are present interest rates tend to rise by more than the rate of inflation. However, as there is some correlation between the debt variable and the deficit variable, one must be careful in interpreting the coefficients. 4/

1/ For the 1981-84 period the cyclically adjusted deficit as a percent of GNP was respectively 1.9 in 1981, 2.9 in 1982, 3.7 in 1983, and 4.7 in 1984. In the previous 20 years it never exceeded 3 percent.

2/ This might be rationalized on the basis of some tax effect. See Vito Tanzi, "Inflation, Indexation and Interest Income Taxation," *Quarterly Review*, Banca Nazionale del Lavoro (Rome), No. 29 (March 1976), pp. 54-76.

3/ Equation (6) is corrected for serial correlation.

4/ The correlation between Debt and DU is 0.47; that between Debt and DL is 0.62.

The equations in Table 2 would seem to provide support for the contention that the fiscal policy has an impact on interest rates. *Ceteris paribus*, the higher the ratio of the fiscal deficit to GNP, the higher the rate of interest. Similar results are obtained with the public debt. Table 2, however, refers to the 1960-80 period, a period when fiscal deficits never became very large and when the ratio of public debt to GNP generally fell. Much of the recent controversy about the impact of fiscal deficits on interest rates has concerned the post-1980 period when the deficit reached very high levels for nonwar years. It would thus be useful to extend the period to 1984 being aware, however, that there may have been a discontinuity in the structure of the underlying model used in the regressions.

2. The 1960-84 period

Table 3 gives the results obtained when the regressions shown in Table 2 are re-estimated for the 1960-84 period. No other change is made except for the addition of the four observations for the 1981-84 period. The results in Table 3 are generally not as good as those in Table 2. All the equations needed to be corrected for serial correlation. Furthermore, some of our hypotheses are no longer validated. For example, economic activity, G , is no longer significant and its coefficient is now much lower than in Table 2. Additionally, the fiscal variables become either insignificant or, in a few cases, they just pass the significance test at the 5 percent level.

The inflationary expectation variable, however, remains highly significant and continues to have coefficients consistent with the theory. On the basis of the results in Table 3 one would hesitate to argue strongly that the fiscal deficit and the public debt have much to do with the determination of interest rates. This is disappointing because as already mentioned, it is exactly for the 1981-84 period that the discussion of whether the U.S. fiscal deficits affect interest rates has been particularly intense. If one fails to find a relationship for a period including those years, one might as well abandon the view that fiscal deficits play a role in the determination of interest rates. Before taking this route, however, one must ask whether something might have happened, after 1980, that might have distorted the relationships shown in Table 3.

Suppose, for example, that some factors not taken into account by the equations shown in Table 3 (because they were not important before 1981) came to play a role in the 1981-84 period. It is then possible that the omission of these factors could affect the relationships and could thus render insignificant some of the variables. We know that several important policy changes were taking place during this period. First, there was the deregulation of the financial market that could have raised the level of interest rates. Second, there was the change in monetary policy which, by bringing about a rapid deceleration in the rate

Table 3

Regressions for the 1960-84 Period

(8)	$2.561 + 0.970\pi_t + 0.108G_t$ (2.490)*(5.378)** (0.920)	$\bar{R}^2 = 0.836$ D.W. = 1.875
(9)	$2.944 + 0.980\pi_t - 0.035G_t + 0.379DU_t$ (2.287)*(5.102)** (0.208) (1.434)	$\bar{R}^2 = 0.841$ D.W. = 1.906
(10)	$3.247 + 0.950\pi_t + 0.097G_t + 0.256DL_t$ (2.230)*(4.806)** (0.735) (0.809)	$\bar{R}^2 = 0.830$ D.W. = 1.958
(11)	$-1.546 + 1.108\pi_t + 0.154G_t + 0.111Debt_t$ (-0.512) (5.562)** (1.295) (1.434)	$\bar{R}^2 = 0.843$ D.W. = 1.831
(12)	$-2.050 + 1.088\pi_t - 0.019G_t + 0.587DU_t + 0.178Debt_t$ (0.690) (5.757)** (0.128) (2.498)* (2.451)*	$\bar{R}^2 = 0.870$ D.W. = 1.779
(13)	$1.122 + 0.977\pi_t + 0.1905G_t + 0.589DL_t + 0.164Debt_t$ (0.290) (5.080)** (1.550) (2.110)* (2.250)*	$\bar{R}^2 = 0.856$ D.W. = 2.095

Note: All the equations have been adjusted for serial correlation using a first-order Cochrane-Orcutt correction.

of inflation, could have induced individuals to increase their demand for money. In other words, we could have had the reverse of the well-known Mundell-Tobin effect. 1/ Third, and perhaps more importantly, were the changes in the tax laws brought about by the Reagan administration. Fourth, there was a lot of merger activity in this period that raised the demand for credit. Finally, some external factors, such as the debt crisis and the disappearing OPEC surplus, could also have played a role.

The changes in tax rules introduced in 1981 and 1982 implied a considerable reduction in the net cost of capital as compared to what it would have been under 1980 tax laws. They thus increased the rate of return to real investment. This increase has been estimated differently by different observers but it is likely to have raised at least for a while the rate of return on new investments by several percentage points. 2/ An increase in the rate of return to real investment cannot fail to affect real interest rates either because the demand for funds rises in response to the increase in investment, or because those who have funds available would prefer to invest them in equity rather than in financial assets if the rate of return on the latter does not change. 3/

The realization that after 1980 there may have been some structural changes in the relationships discussed earlier, a realization supported by the results shown in Table 3, implies that, somehow, we need to take account of these changes. The best option would of course be that of adding additional independent variables that reflect those changes. Unfortunately, statistical series that would make this course of action possible do not seem to be available. We must thus rely on second-best alternatives. The most straightforward alternative is to add, as an independent variable, a dummy that would take the value of zero for the 1960-80 period and of one for the 1981-84 period. The implicit assumption behind this approach is that the factors discussed above changed the

1/ For a discussion of the role that the increased demand for money might have had on interest rates, see John H. Makin and Vito Tanzi, "Level and Volatility of U.S. Interest Rates: Role of Expected Inflation, Real Rates, and Taxes," in Taxation, Inflation, and Interest Rates, ed. by Vito Tanzi (Washington: International Monetary Fund, 1984) pp. 110-42.

2/ See U.S. Council of Economic Advisors, Economic Report of the President, 1982 (Washington: U.S. Government Printing Office), especially pp. 122-25; Stephen A. Meyer, "Tax Policy Effects on Investment: The 1981 and 1982 Tax Acts," Business Review (Federal Reserve Bank of Philadelphia, November/December 1984), pp. 3-14; and Leonard Sahling and M. A. Akhtar, "What is Behind the Capital Spending Boom?" Quarterly Review, Federal Reserve Bank of New York (Winter 1984-85), pp. 19-30.

3/ If these tax changes raise the rate of return to private investment and if, as B. Friedman (1984) argues, there is an absolute limit to total domestic debt, the government will be able to increase its proportion of that total only if it is willing to pay much higher interest rates on its borrowing.

level of the rate of interest without changing, once this level change is taken into account, the historical relationship between interest rates and the other variables already considered. In other words it assumes that the regression line shifted in 1981-84 but remained parallel to that for the 1960-80 period. ^{1/} When this is done the results obtained are shown in Table 4. Table 4 is the same as Table 3 except for the fact that a dummy represented by the symbol V has been added.

The results in Table 4 are indeed remarkable. In all respects they are substantially superior to those in Table 3. First of all, none of the regressions shown in Table 4 needed to be adjusted for serial correlation while all of those in Table 3 had to be adjusted; still the Durbin-Watson statistics are very good. Second, the $\bar{R}^2$ are much higher than in Table 3 and in fact are well above those in Table 2. In all equations containing fiscal variables they are higher than 0.90. Thus the addition of the fiscal variables significantly improves the explanatory power of the equations. Third, the gap variable is again highly significant except for equation (15). The problem here is the high correlation between G_t and DU_t . Once a cyclically adjusted deficit replaces the cyclically sensitive deficit utilized in equation (15), the gap becomes significant. The fiscal deficit is again significant. The same is true for the variable representing public debt.

One interesting result worth calling attention to is the coefficient of the dummy variable. In all the equations, that coefficient ranges between 3.4 and 4.5 percent. This could be interpreted as meaning that the net effects of the factors peculiar to the 1981-84 period discussed above, but excluding the deficit, raised interest rates by around 4 percent in this more recent period. ^{2/}

^{1/} This is a restrictive assumption that implies that all the change is reflected in the constant term.

^{2/} An attempt was also made to test more directly the expected real rate of interest by removing π from the independent variables and taking $(R - \pi)$ as the dependent variable. The results obtained for the three basic equations for the period 1960-84 are:

$$\begin{array}{ll} (R - \pi)_t = 2.405 + 0.283G_t + 3.426V & \bar{R}^2 = 0.587 \\ (7.08)** (3.500)** (4.560)** & D.W. = 2.196 \\ \\ (R - \pi)_t = 3.352 + 0.260G + 0.631DL + 4.513V & \bar{R}^2 = 0.586 \\ (9.210)** (3.910)** (3.470)** (6.050)** & D.W. = 1.914 \\ \\ (R - \pi)_t = -0.982 + 0.257G + 0.102Debt_t + 3.435V & \bar{R}^2 = 0.639 \\ (1.120) (4.140)** (4.110)** (5.770)** & D.W. = 1.632 \end{array}$$

The first of these equations has been corrected for serial correlation. The coefficient of the dummy is again 4 percent.

Table 4

Regressions for the 1960-84 Period
(with dummy)

(14)	$3.194 + 0.770\pi_t + 0.193G_t + 3.630V$ (8.486)**(9.509)** (2.663)** (5.219)**	$\bar{R}^2 = 0.884$ D.W. = 1.503
(15)	$3.293 + 0.844\pi_t + 0.100G_t + 0.436DU_t + 4.112V$ (9.570)**(10.552)** (1.309) (2.347)* (6.196)**	$\bar{R}^2 = 0.904$ D.W. = 1.966
(16)	$3.619 + 0.852\pi_t + 0.225G_t + 0.488DL_t + 4.518V$ (9.748)**(10.874)** (3.450)** (2.603)** (6.416)**	$\bar{R}^2 = 0.910$ D.W. = 2.091
(17)	$-1.592 + 1.047\pi_t + 0.268G_t + 0.115Debt_t + 3.375V$ (0.814) (7.864)** (3.747)** (2.483)* (5.343)**	$\bar{R}^2 = 0.907$ D.W. = 1.636
(18)	$-0.643 + 1.055\pi_t + 0.181G_t + 0.347DU_t + 0.094Debt_t + 3.805V$ (0.340) (8.473)** (2.252)* (1.965) (2.109)* (6.039)**	$\bar{R}^2 = 0.918$ D.W. = 1.864
(19)	$-0.235 + 1.054\pi_t + 0.279G_t + 0.394DL_t + 0.091Debt_t + 4.146V$ (0.120) (8.640)** (4.230)** (2.190)* (2.070)* (6.12)**	$\bar{R}^2 = 0.922$ D.W. = 2.053

Note: Numbers in parenthesis are t statistics. Two stars indicate significance at 1 percent level; one star indicates significance at 5 percent level.

It may be worthwhile at this point to look back at Table 2, which covers the 1960-80 period, and compare its results with those in Table 4. We should pay particular attention to the coefficients of the variables to identify any changes. The coefficients of both π and G are smaller in the 1960-84 period than in the 1960-80 period. However, it is the coefficients of the fiscal variables and particularly of the deficit variables that have fallen the most. For example, comparing the coefficient of DL in equation (4) and in equation (16) we observe a fall from 0.84 to 0.49. This would indicate that the impact of a deficit of a given size (measured as a percent of GNP) on interest rates was somewhat lower in the 1981-84 period than in the previous period. A possible explanation of this change was provided in the already cited paper by the author which pointed out that, ^{1/} as international financial markets have become much more integrated in recent years, the U.S. deficit can now be financed more easily than in the past by foreign savings through capital inflows. Capital inflows have been very high in the past 2-3 years.

In view of the restrictive assumption behind the use of the dummy as in Table 4 and of the apparent changes in the coefficients of the key variables, an attempt was made to formally test the hypothesis that some of the key parameters (i.e., slopes) other than the constant term might have shifted between 1960-80 and 1981-84. To do this, new dummy variables (slope dummies) were added to the equations in Table 3. These new dummy variables were: $G_t \cdot V_t$, $DU_t \cdot V_t$, $DL_t \cdot V_t$, and $Debt_t \cdot V_t$, where all the symbols have the same meaning as earlier. If the coefficients for the newly defined variables are significant, the hypothesis that some of the key parameters (beside the constant term) might have shifted would be accepted. In one alternative only a slope dummy was used to test whether the coefficient of a selected variable in each equation had shifted; in another alternative, both a constant dummy and a slope dummy were used to test whether both the constant and the slope dummy had shifted.

The regression equations so estimated are not shown, but the results can be summarized as follows:

a. In these alternative formulations of testing for shifts of the equations, the statistical significance of the key independent variables (inflationary expectations, economic activity, deficit, and debt variables) is not diminished.

b. In the regressions testing the shifts of both the constant and the slope, the estimates of the coefficients of the slope dummy variables

^{1/} See Tanzi, "The Deficit Experience in Industrial Countries" (1985).

are either insignificant or only marginally significant probably because of multicollinearity between the constant dummy and the slope dummy variables. However, the positive estimates of the coefficient of the V variable are compatible with the results of Table 4. Also the negative estimates of the slopes, implying a smaller slope for 1981-84 than for 1960-80, appear to be broadly compatible with the similar results implied by the regressions reported in Tables 2 and 4. As already pointed out, the coefficients for G, π , and the DL are smaller for 1960-84 than for 1960-80.

c. The new regressions (not reported) suggest that the slopes may have shifted while the results in Table 4 suggest that the constant may have shifted. Possibly both the slopes and the constant shifted. Therefore, some caution is required in the interpretation of the results. The new regressions, however, support the results in Table 4 by suggesting strong structural shifts of the equations between 1960-80 and 1981-84.

d. The new equations also suffer from the problem observed in the reported tables; whenever the debt variable is included, the constant term becomes insignificant and carries a negative sign. It is not obvious why this is so.

3. Additional results

In addition to the results shown above, other statistical tests were conducted. The specific regression equations for these tests are not shown as the results were generally not interesting. They can be summarized briefly. First, other series for the debt variable were used in addition to the one reported above. More specifically, these other series were: (a) public debt at market value as a share of trend GNP; (b) public debt at par value as a share of trend GNP; and (c) cyclically adjusted public debt at market value as a share of trend GNP. These alternatives made little difference to the results.

Second, as some economists have argued that government expenditure may be an important variable in the determination of interest rates, ^{1/} this variable was added to the other independent variables discussed above. More specifically, the following versions were tried: (a) total government expenditure as a share of actual GNP; (b) cyclically adjusted total expenditure as a share of trend GNP; (c) federal expenditure as a share of actual GNP. Government expenditure failed to be significant in any of these attempts.

^{1/} See Charles I. Plosser, "Government Financing Decisions and Asset Returns," Journal of Monetary Economics (Amsterdam), Vol. 9 (May 1982), pp. 325-52.

Finally, the rate of interest on longer-term Treasury bills was tried as the dependent variable. The results were disappointing. This outcome should have been expected as the framework utilized in this paper does not lend itself to an analysis of longer term securities. First, and most importantly, the inflationary expectation variable available covers at most a period of 18 months so that other methods would have to be used to estimate inflationary expectations for longer periods. There is no reason why, for example, inflationary expectations for the next 12 months should be relevant for bonds of longer maturities. 1/ Second, long-term bonds are much less likely to be influenced by cyclical fluctuations than shorter term bonds. If they were as influenced by these fluctuations as the Treasury bills, corporations would find it to their advantage to borrow during recessions, even though they might actually not need the funds until later. This expected behavior by corporations would obviously reduce the movement in rates of return to long-term bonds during the cycle. Finally, the fiscal deficit of a particular year, unless it was seen to reflect a more permanent stance of fiscal policy, should not have a large influence on bonds that cover much longer periods. The debt variable, on the other hand, should have been significant but it was not. Interestingly enough even in these equations related to long-term bonds the coefficient of the dummy was still around 4 percentage points. 2/

1/ For example, the one-year expectations used in this paper were, for the 1981-84 period, respectively, 10.3, 7.2, 5.1, and 5.6. On the other hand, ten-year inflationary expectations in those same years were 8.7, 7.9, 6.8, and 6.2. The latter are based on a survey by Drexel Burnham Lambert Inc.

2/ For an analysis that focuses on long-term interest rates see: Patrice Muller and Robert Price, "Public Sector Indebtedness and Long-Term Interest Rates" (mimeographed, Washington: World-Bank-Brookings Workshop, September 1984)--preliminary draft prepared for the Conference on the International Consequences of Budgetary Deficits in the OECD. See also de Leeuw and Holloway (1985) for results related to three-year Treasury bills. Both of these papers find that the deficit had a significant effect on interest rates.

IV. Summary and Conclusions

This paper has dealt with the ongoing controversy on (a) whether fiscal deficits bring about higher interest rates, and (b) whether the historically high fiscal deficits that the United States has experienced in recent years have been the main factor explaining the extraordinarily high level of real interest rates. On the basis of a simple model of interest rate determination that included among the explanatory factors nonfiscal variables as well as fiscal variables, it has been shown that interest rates are, in fact, positively influenced by fiscal deficits and (possibly) by levels of public debt. The empirical results indicate that if the U.S. fiscal deficit had been lower, interest rates would have been somewhat lower, *ceteris paribus*. On the basis of the statistical tests, it can be estimated that a balanced budget would have reduced interest rates on one-year Treasury bills by more than 2 percentage points in 1984. A one percent of GNP reduction in the fiscal deficit would reduce interest rates by about 50 basis points (one half of one percentage point). Thus on the issue of whether fiscal deficits do or do not affect real interest rates, the paper sides with those who maintain that they do.

The paper has also concluded, however, that a large part of the increase in real interest rates in the 1981-84 period was not associated with the fiscal deficit but with other factors. Potential candidates among these are deregulation of the financial market, mergers, changes in monetary policy, and, perhaps more importantly, changes in tax legislation. Other factors, including nondomestic ones, may also have played a role. Changes in tax legislation introduced in 1981 and 1982 may have been responsible for part of the total rise. If one believes the statistical results shown in Table 4, these other factors may have contributed as much as 4 percentage points of the total rise in the expected real rate that occurred in 1981-84. Whether this rise is permanent or temporary remains to be seen. By inducing a large capital spending boom, the changes in tax rules are likely to have contributed to the rise in interest rates in the short run. However, as additional investment leads to a higher capital stock, the rate of return to investment must fall, thus reducing further capital spending and, as a consequence, reducing interest rates.

Attention should be called to the fact that the sensitivity of interest rates to fiscal deficits seems to have fallen in recent years. A deficit of a given magnitude (as a share of GNP) results in a lower increase in interest rates now than it did in the past. This is consistent with the hypothesis that international financial markets are now much better integrated than they were even a few years ago. The consequence of this development is that a rise in interest rates in one country (say, caused by a rising fiscal deficit) attracts capital from

abroad. As part of the deficit is financed by foreigners, there is less pressure on the domestic financial market. Therefore, interest rates rise by less than they would have risen in the past. Of course, this advantage does not come without costs as growing reliance on foreign financing is inevitably accompanied by growing uncertainty and potential instability.

The statistical tests provided strong support to the Fisher hypothesis. Inflationary expectations did prove to be highly significant. The coefficients of π were mostly either close to one, as one would expect from the traditional Fisher hypothesis, or above one, as one would expect from the tax-adjusted version of it. The role of changes in the level of business activity in the determination of interest rates, was also highlighted. This particular result may help explain the sharp fall in interest rates in recent months when the rate of growth of the economy slowed down considerably. 1/

Perhaps a word of caution is necessary. Although the statistical results are relatively strong and, in the author's judgment, are consistent with economic theory, they cannot be taken as proving the case beyond doubt. This type of work can never give definitive answers and is never beyond criticism. Undoubtedly some will disagree with the statistical tests. Others may point out that the relationships tested are not based on a fully specified structural model. Still the results are unusually strong and, for those who believe in empirical tests, they seem to indicate that deficits matter quite a lot in the determination of interest rates.

1/ The slowdown in investment spending must also have played a role. Obviously, these two factors are related.

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