

**MEASURING THE FEDERAL DEBT AND DEFICIT:
ADJUSTMENTS AND RATIONALES**

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INTRODUCTION

The unusually large federal deficits experienced in recent years and projected to persist indefinitely under current budget policies have generated considerable interest not only in budget actions to reduce the deficit but also in alternative methods for measuring the deficit. In particular, Robert Eisner and Paul J. Pieper recently have argued that the conventional measure of the deficit--the excess of government outlays over revenues--is not an adequate measure for assessing the impact of the budget on the economy.¹ An appropriate measure, in their view, would include adjustments for factors affecting private net wealth such as capital gains (losses) on federal debt resulting from changes in interest rates, deterioration in the real value of federal debt owing to inflation, and federal accumulation of financial assets. They also would adjust the deficit for the passive response of the budget to the business cycle. According to Eisner and Pieper, such adjustments substantially reduce the apparent size of federal deficits in the years prior to the 1981-1982 recession, and could have a significant impact on the fiscal policy outlook. Although the updated analysis presented here suggests similar findings, deficits are projected to

¹ Robert Eisner and Paul J. Pieper, "A New View of the Federal Debt and Budget Deficits, American Economic Review, vol. 74, no. 1 (March 1984).

be much larger in the 1980s than in the 1970s, even when adjustments to the deficits have been taken into account.

The first two sections of this paper present measures of the deficit and debt reflecting the adjustments proposed by Eisner and Pieper. Both historical data and projections through 1990 are provided. The third section assesses the rationale for each type of adjustment, and examines the implicit assumptions regarding public- and private-sector behavior. The final section considers the policy implications of the adjusted debt and deficit measures. A technical appendix describes the methodology used in producing the various debt and deficit adjustments.

ALTERNATIVE MEASURES OF THE FEDERAL DEFICIT

Several measures of the federal deficit for calendar years 1955 through 1990 are presented in Table 1. The first column is the federal deficit as reported in the National Income and Product Accounts (NIPA). The second column is the change in publicly held debt--a measure that closely resembles the total (that is, unified plus off-budget) federal deficit.² Column (3) shows the NIPA deficit adjusted for (a) capital gains (losses) on federal debt resulting

² The change in publicly held debt reflects all acquisitions except those of U.S. government trust funds; that is, acquisitions by the private sector, foreigners, state and local governments, and the open market operations of the Federal Reserve.

TABLE 1. ALTERNATIVE MEASURES OF THE FEDERAL DEFICIT
(By calendar year, in billions of dollars)

	(1)	(2)	(3)	(4)	(5)	(6)
	NIPA DEFICIT	CHANGE IN PUBLICLY HELD DEBT	ADJUSTED DEFICIT	PAR-TO- MARKET EFFECT	INFLATION EFFECT	CYCLICAL EFFECT
1955	-4.5	-0.8	-16.0	-3.6	-6.0	-1.9
1956	-6.0	-5.8	-21.0	-3.4	-8.3	-3.4
1957	-2.2	-2.3	-7.2	5.3	-4.8	-5.4
1958	10.4	9.3	-11.3	-5.8	-4.2	-11.7
1959	1.1	7.1	-15.5	-4.0	-4.8	-7.9
1960	-3.0	-2.1	-6.1	9.4	-2.3	-10.2
1961	3.9	7.2	-14.1	-2.3	-3.3	-12.3
1962	4.2	7.0	-6.4	2.1	-4.3	-8.5
1963	-0.3	4.0	-14.7	-2.8	-3.3	-8.3
1964	3.3	6.2	-5.3	0.3	-3.8	-5.1
1965	-0.5	1.8	-10.2	-3.0	-5.9	-0.8
1966	1.8	3.6	-0.4	1.9	-8.1	4.1
1967	13.2	13.0	3.4	-4.1	-8.0	2.4
1968	6.1	13.6	-0.7	-1.2	-11.5	6.0
1969	-8.4	-3.7	-23.9	-7.0	-13.5	5.0
1970	12.4	11.9	7.1	14.1	-12.3	-7.1
1971	22.0	24.9	4.0	3.6	-12.5	-9.0
1972	16.8	15.1	-2.8	-4.7	-12.4	-2.5
1973	5.6	8.3	-12.1	-3.2	-21.5	7.0
1974	11.5	11.8	-25.8	2.7	-31.5	-8.5
1975	69.3	85.4	11.5	2.7	-23.3	-37.2
1976	53.1	69.5	14.4	12.5	-20.8	-30.4
1977	45.9	56.8	-19.6	-16.9	-28.8	-19.7
1978	29.5	53.7	-39.7	-18.6	-43.9	-6.7
1979	16.1	37.4	-34.8	-1.7	-42.7	-6.5
1980	61.3	79.2	-44.2	-12.6	-56.4	-36.5
1981	64.3	87.4	-16.9	17.0	-50.3	-47.9
1982	148.2	161.3	59.2	48.1	-33.2	-103.8
1983	178.6	186.6	12.9	-26.6	-35.5	-103.6
1984	175.7	198.8	94.3	12.7	-39.3	-54.8
1985	172.2	208.5	70.3	-3.4	-56.7	-41.9
1986	188.6	223.3	82.9	0.6	-68.9	-37.5
1987	208.5	243.1	104.0	0.8	-72.4	-32.9
1988	223.2	261.4	115.5	0.6	-81.7	-26.5
1989	249.3	283.9	138.5	0.7	-91.9	-19.6
1990	278.5	306.0	164.2	1.0	-102.9	-12.5

SOURCES: CONGRESSIONAL BUDGET OFFICE; U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS; FEDERAL RESERVE BOARD.

TABLE 2. ALTERNATIVE MEASURES OF THE FEDERAL DEFICIT
(By calendar year, as a percentage of GNP)

	(1)	(2)	(3)	(4)	(5)	(6)
	NIPA DEFICIT	CHANGE IN PUBLICLY HELD DEBT	ADJUSTED DEFICIT	PAR-TO- MARKET EFFECT	INFLATION EFFECT	CYCLICAL EFFECT
1955	-1.1	-0.2	-4.0	-0.9	-1.5	-0.5
1956	-1.4	-1.4	-5.0	-0.8	-2.0	-0.8
1957	-0.5	-0.5	-1.6	1.2	-1.1	-1.2
1958	2.3	2.1	-2.5	-1.3	-0.9	-2.6
1959	0.2	1.5	-3.2	-0.8	-1.0	-1.6
1960	-0.6	-0.4	-1.2	1.9	-0.4	-2.0
1961	0.7	1.4	-2.7	-0.4	-0.6	-2.3
1962	0.7	1.2	-1.1	0.4	-0.8	-1.5
1963	0.0	0.7	-2.5	-0.5	-0.6	-1.4
1964	0.5	1.0	-0.8	0.0	-0.6	-0.8
1965	-0.1	0.3	-1.5	-0.4	-0.8	-0.1
1966	0.2	0.5	0.0	0.2	-1.1	0.5
1967	1.6	1.6	0.4	-0.5	-1.0	0.3
1968	0.7	1.6	-0.1	-0.1	-1.3	0.7
1969	-0.9	-0.4	-2.5	-0.7	-1.4	0.5
1970	1.3	1.2	0.7	1.4	-1.2	-0.7
1971	2.0	2.3	0.4	0.3	-1.2	-0.8
1972	1.4	1.3	-0.2	-0.4	-1.0	-0.2
1973	0.4	0.6	-0.9	-0.2	-1.6	0.5
1974	0.8	0.8	-1.8	0.2	-2.2	-0.6
1975	4.5	5.5	0.7	0.2	-1.5	-2.4
1976	3.1	4.0	0.8	0.7	-1.2	-1.8
1977	2.4	3.0	-1.0	-0.9	-1.5	-1.0
1978	1.4	2.5	-1.8	-0.9	-2.0	-0.3
1979	0.7	1.5	-1.4	-0.1	-1.8	-0.3
1980	2.3	3.0	-1.7	-0.5	-2.1	-1.4
1981	2.2	3.0	-0.6	0.6	-1.7	-1.6
1982	4.8	5.3	1.9	1.6	-1.1	-3.4
1983	5.4	5.6	0.4	-0.8	-1.1	-3.1
1984	4.8	5.4	2.6	0.3	-1.1	-1.5
1985	4.4	5.3	1.8	-0.1	-1.4	-1.1
1986	4.5	5.3	2.0	0.0	-1.6	-0.9
1987	4.6	5.3	2.3	0.0	-1.6	-0.7
1988	4.5	5.3	2.3	0.0	-1.7	-0.5
1989	4.7	5.4	2.6	0.0	-1.7	-0.4
1990	4.9	5.4	2.9	0.0	-1.8	-0.2

SOURCES: CONGRESSIONAL BUDGET OFFICE; U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS; FEDERAL RESERVE BOARD.

from changes in interest rates, (b) the deterioration in the real value of federal debt owing to inflation, and (c) cyclical increases in the debt as a result of business cycles rather than of policy changes. These adjustments are displayed separately in columns (4), (5), and (6). Table 2 presents the data in Table 1 as percentages of gross national product (GNP).

As can be seen from Table 1, in many periods these adjustments substantially alter the apparent fiscal position of the federal government. For example, in 1984 the various offsets to the deficit appearing in columns (4) through (6) reduce the deficit (measured on a NIPA basis) by \$81 billion. By 1990, the combined projected offset amounts to \$114 billion. During 1980-1984, the adjusted deficit rose by 4.3 percent of GNP, while the unadjusted (NIPA) deficit rose by 2.5 percent of GNP. During 1984-1990, these two deficit measures are projected to rise by 0.3 percent and 0.1 percent of GNP, respectively.

The National Income and Product
Accounts (NIPA) Federal Deficit

The NIPA measure of the federal deficit differs from the unified budget measure (adjusted to include off-budget outlays) mainly in that it excludes most financial transactions, such as federal direct lending to the private sector, and records certain types of revenues and outlays on an accrual basis

rather than on a cash basis.³ Because of these differences, the NIPA measure of the federal deficit generally is considered superior to the unified budget measure for assessing the impact of the federal sector on aggregate demand. However, because of these differences, the NIPA deficit does not equal the change in publicly held debt (compare columns (1) and (2) in Table 1).

The Change in Publicly Held Debt

The change in the publicly held debt is a measure of federal borrowing from the public (including the Federal Reserve). The difference between this measure and the total deficit is the extent to which the government uses sources of financing other than borrowing (for example, changes in its cash balances). Many analysts use the change in publicly held debt to assess the impacts of federal budget policies on the credit market. Others argue, however, that neither federal borrowing nor the NIPA deficit is a satisfactory measure for assessing the economic effects of the budget.

³ More generally, the construction of the NIPA deficit differs from that of the unified budget deficit in four respects: timing of transactions, netting and grossing of receipts against spending, treatment of lending activities, and coverage. For a discussion of those differences, see Congressional Budget Office, Baseline Budget Projections for Fiscal Years 1984-1989 (February 1984).

The Adjusted Deficit

Whether one begins with the NIPA deficit or with federal borrowing, several adjustments can be made to arrive at a more refined measure of the deficit, such as the "adjusted deficit" shown in column (3) of Table 1. This measure includes adjustments for (a) capital gains (losses) on federal debt resulting from changes in interest rates, (b) deterioration in the real value of federal debt owing to inflation, and (c) cyclical budget effects.

Par-to-Market Adjustment. The first adjustment to the measured deficit reduces it whenever the market value of federal debt declines relative to the par value. This happens when interest rates on new federal debt rise relative to the coupon rate of interest on outstanding federal debt of the same maturity.⁴ The assumption underlying this adjustment is that a loss in market value induces holders of outstanding debt to save more in order to restore the market value of their wealth. To the extent that savers respond in this manner, the aggregate demand and credit market impacts of federal deficits are reduced dollar for dollar.

⁴ Although the par-to-market effects in Table 1 indicate minor capital gains during 1986-1990, one might expect small capital losses instead. The reason is that with CBO projections of essentially constant interest rates that are lower, in nominal terms, than the average coupon rate on outstanding debt, the market value of outstanding federal debt would fall toward the par value as the debt is refinanced at lower interest rates. If the entire debt were refinanced today, the par and market values would coincide after refinancing, but then would diverge when interest rates changed.

It is not clear, however, to what extent and how quickly the private sector does increase its savings in response to capital losses stemming from interest rate movements. Such losses may not be immediately perceived as permanent, and thus as having an effect on permanent income--a measure thought to be more relevant than measured income in explaining consumption and saving behavior.

Inflation Adjustment. This adjustment reduces the conventional deficit measure for any (anticipated or unanticipated) decline in purchasing power resulting from a fall in the real value of federal debt caused by inflation.⁵ The higher the rate of inflation, the larger the size of this adjustment will be. In effect, this adjustment expresses the deficit as the change in the real value of federal debt. Alternatively, it can be viewed as calculating the deficit with federal interest payments expressed in real rather than in nominal terms.

The implicit assumption here is that private agents immediately increase their rate of saving to restore any loss in the real value of their

⁵ When the inflation rate rises and induces an increase in expected inflation and nominal interest rates, care must be taken not to double count the inflation and interest rate adjustments to the deficit. This is accomplished by using the market value rather than the par value of the debt when computing the inflation adjustment. The technical appendix discusses the formulas employed.

wealth caused by inflation. (If this assumption is adopted, it should be reflected in projected private saving rates.) To the extent that saving rates do not rise, this adjustment for inflation will tend to understate the impact of the deficit on the credit market by overstating the induced increase in the supply of credit relative to the increase in demand. If inflation is fully anticipated, it will be reflected in higher nominal interest rates and thus in federal interest payments. To the extent that holders of federal debt view the inflation component of interest receipts as a return of capital rather than as income, they are more likely to save rather than consume these receipts. In the case of unanticipated inflation, however, there is no compensating increase in interest receipts, and the saving response to uncompensated capital losses may be quite small.⁶

Cyclical Adjustment. This adjustment is for the passive response of the budget to deviations of output and unemployment from benchmark levels. When the unemployment rate is higher than the benchmark (assumed by CBO to be 6 percent), the deficit is reduced because this adjustment raises revenues to the level that would be realized at 6 percent unemployment, and subtracts outlays incurred when unemployment rises above 6 percent. The

⁶ Cagan notes that the saving response may be as small as 2 percent to 5 percent of the uncompensated capital loss. He also suggests that the saving response to fully anticipated inflation may not be sufficient to keep real wealth intact in real terms. See Phillip Cagan, "Financing the Deficit, Interest Rates, and Monetary Policy," in Phillip Cagan, ed., Essays in Contemporary Economic Problems (Washington, D.C.: American Enterprise Institute, 1985).

objective of this adjustment is to isolate a measure of autonomous or discretionary fiscal policy.

ALTERNATIVE MEASURES OF THE FEDERAL DEBT

Several measures of the federal debt for calendar years 1955 through 1990 are presented in Table 3. The first column is the stock of publicly held debt measured at the end of the year. The "net debt" is shown in column (4). It equals publicly held debt (column 1) plus nondebt liabilities (column 2) minus federal financial assets, including gold (column 3). Column (7) is the "adjusted net debt"--the sum of net debt plus the par-to-market and cyclical adjustments appearing in columns (5) and (6). Table 4 shows these data expressed as percentages of GNP.

The adjustments in Table 3 reduce the apparent size of the federal debt as measured by the stock of publicly held debt. For example, at the end of 1984, the net debt was \$136 billion less than the \$1,377 billion stock of publicly held debt. Moreover, the adjusted net debt amounted to only \$1,080 billion. If these debt measures are expressed in constant 1972 dollars, the size of each is reduced by more than half in 1984. Relative to GNP, however, the difference between the adjusted net debt and publicly-held debt declines from 8.1 percent in 1984 to 3.6 percent by 1990.

TABLE 3. ALTERNATIVE MEASURES OF THE FEDERAL DEBT
(By calendar year, in billions of dollars)

	(1) PUBLICLY HELD DEBT	(2) OTHER FEDERAL LIABILITIES	(3) FEDERAL FINANCIAL ASSETS	(4) NET FEDERAL DEBT	(5) PAR-TO-MARKET ADJUSTMENT	(6) CYCLICAL ADJUSTMENT	(7) ADJUSTED NET DEBT	(8) MARKET VALUE OF GOLD	GNP DEFLATOR
1955	230.0	81.1	108.8	202.3	-3.0	0.7	200.0	21.8	61.7
1956	224.2	83.7	110.2	197.7	-6.4	0.4	191.8	22.1	64.0
1957	222.0	85.7	111.1	196.5	-1.1	-0.5	194.9	22.9	65.5
1958	231.3	86.7	110.3	207.7	-6.8	-6.4	194.4	20.6	66.8
1959	238.3	89.9	117.6	210.6	-10.8	-7.1	192.8	19.5	68.2
1960	236.3	91.1	118.7	208.8	-1.4	-9.5	197.9	17.8	68.9
1961	243.5	94.7	123.8	214.4	-3.7	-13.9	196.8	16.9	69.9
1962	250.5	99.3	130.8	218.9	-1.6	-14.2	203.1	16.1	71.2
1963	254.4	104.0	138.0	220.4	-4.4	-14.3	201.7	15.6	72.3
1964	260.7	109.0	145.6	224.0	-4.1	-12.0	207.9	15.5	73.5
1965	262.4	115.6	153.3	224.7	-7.1	-5.6	211.9	13.8	75.3
1966	266.1	128.4	166.3	228.1	-5.2	5.7	228.5	13.2	78.0
1967	279.1	136.0	173.5	241.6	-9.3	14.8	247.1	12.1	80.6
1968	292.6	144.9	186.8	250.8	-12.9	27.1	265.0	13.2	84.5
1969	289.0	159.6	203.9	244.6	-17.7	37.5	264.4	12.1	89.3
1970	300.8	177.2	221.0	257.0	-4.3	34.2	286.9	12.0	93.7
1971	325.7	189.1	234.3	280.4	-2.5	27.4	305.3	12.8	98.1
1972	340.8	199.6	242.9	297.4	-12.2	25.8	311.1	18.0	102.2
1973	349.1	230.2	276.0	303.3	-27.3	35.8	311.8	31.1	109.7
1974	360.8	259.0	305.8	314.1	-47.2	32.8	299.7	53.7	121.3
1975	446.3	280.0	338.5	387.7	-29.5	3.8	362.0	38.7	129.6
1976	515.8	303.7	374.1	445.4	-15.4	-14.6	415.4	37.2	135.9
1977	572.5	328.5	399.4	501.6	-40.9	-16.6	444.1	45.9	144.2
1978	626.2	379.4	466.4	539.2	-76.2	0.2	463.2	62.6	157.0
1979	663.6	430.7	530.8	563.5	-151.5	22.4	434.4	135.6	170.0
1980	742.8	477.2	592.4	627.5	-184.4	19.5	462.6	155.9	187.6
1981	830.1	532.6	659.8	703.0	-130.4	11.4	583.9	118.9	202.8
1982	991.4	581.1	715.0	857.5	-68.9	-46.7	742.0	105.4	211.6
1983	1,177.9	608.7	737.3	1,049.4	-91.1	-101.1	857.2	101.0	219.4
1984	1,376.8	685.0	820.5	1,241.3	-58.5	-102.5	1,080.3	81.0	227.0
1985	1,585.3	788.7	944.8	1,429.2	-61.8	-86.5	1,280.9	81.0	236.7
1986	1,808.6	899.8	1,077.9	1,630.6	-61.2	-62.2	1,507.2	81.0	247.4
1987	2,051.7	1,020.8	1,222.7	1,849.7	-60.4	-29.5	1,759.8	81.0	257.8
1988	2,313.1	1,150.8	1,378.5	2,085.4	-59.9	14.7	2,040.2	81.0	268.6
1989	2,597.0	1,292.1	1,547.7	2,341.4	-59.1	70.0	2,352.3	81.0	279.9
1990	2,903.0	1,444.3	1,730.0	2,617.3	-58.2	137.6	2,696.6	81.0	291.7

SOURCES: CONGRESSIONAL BUDGET OFFICE; U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS; FEDERAL RESERVE BOARD.

TABLE 4. ALTERNATIVE MEASURES OF THE FEDERAL DEBT
(By calendar year, as a percentage of GNP)

	(1) PUBLICLY HELD DEBT	(2) OTHER FEDERAL LIABILITIES	(3) FEDERAL FINANCIAL ASSETS	(4) NET FEDERAL DEBT	(5) PAR-TO-MARKET ADJUSTMENT	(6) CYCLICAL ADJUSTMENT	(7) ADJUSTED NET DEBT	(8) MARKET VALUE OF GOLD	NOMINAL GNP
1955	57.5	20.3	27.2	50.6	-0.8	0.2	50.0	5.4	400.1
1956	53.2	19.8	26.1	46.9	-1.5	0.1	45.5	5.2	421.7
1957	50.0	19.3	25.0	44.3	-0.2	-0.1	43.9	5.2	444.0
1958	51.4	19.3	24.5	46.2	-1.5	-1.4	43.2	4.6	449.6
1959	48.8	18.4	24.1	43.2	-2.2	-1.5	39.5	4.0	487.9
1960	46.6	18.0	23.4	41.2	-0.3	-1.9	39.1	3.5	506.5
1961	46.4	18.1	23.6	40.9	-0.7	-2.6	37.5	3.2	524.6
1962	44.3	17.6	23.2	38.7	-0.3	-2.5	35.9	2.8	565.0
1963	42.6	17.4	23.1	36.9	-0.7	-2.4	33.8	2.6	596.7
1964	40.9	17.1	22.8	35.1	-0.6	-1.9	32.6	2.4	637.7
1965	38.0	16.7	22.2	32.5	-1.0	-0.8	30.7	2.0	691.0
1966	35.2	17.0	22.0	30.2	-0.7	0.7	30.2	1.7	756.0
1967	34.9	17.0	21.7	30.2	-1.2	1.9	30.9	1.5	799.6
1968	33.5	16.6	21.4	28.7	-1.5	3.1	30.3	1.5	873.4
1969	30.6	16.9	21.6	25.9	-1.9	4.0	28.0	1.3	944.0
1970	30.3	17.9	22.3	25.9	-0.4	3.4	28.9	1.2	992.7
1971	30.2	17.5	21.7	26.0	-0.2	2.5	28.3	1.2	1,077.7
1972	28.7	16.8	20.5	25.1	-1.0	2.2	26.2	1.5	1,185.9
1973	26.3	17.4	20.8	22.9	-2.1	2.7	23.5	2.3	1,326.4
1974	25.2	18.1	21.3	21.9	-3.3	2.3	20.9	3.7	1,434.2
1975	28.8	18.1	21.9	25.0	-1.9	0.2	23.4	2.5	1,549.2
1976	30.0	17.7	21.8	25.9	-0.9	-0.8	24.2	2.2	1,718.0
1977	29.8	17.1	20.8	26.2	-2.1	-0.9	23.2	2.4	1,918.3
1978	28.9	17.5	21.6	24.9	-3.5	0.0	21.4	2.9	2,163.8
1979	27.4	17.8	22.0	23.3	-6.3	0.9	18.0	5.6	2,417.8
1980	28.2	18.1	22.5	23.8	-7.0	0.7	17.6	5.9	2,631.7
1981	28.1	18.0	22.3	23.8	-4.4	0.4	19.7	4.0	2,957.8
1982	32.3	18.9	23.3	27.9	-2.2	-1.5	24.2	3.4	3,069.2
1983	35.6	18.4	22.3	31.8	-2.8	-3.1	25.9	3.1	3,304.8
1984	37.6	18.7	22.4	33.9	-1.6	-2.8	29.5	2.2	3,662.8
1985	40.4	20.1	24.1	36.4	-1.6	-2.2	32.6	2.1	3,926.9
1986	42.7	21.2	25.4	38.5	-1.4	-1.5	35.6	1.9	4,237.5
1987	44.9	22.3	26.8	40.5	-1.3	-0.6	38.5	1.8	4,567.4
1988	47.0	23.4	28.0	42.4	-1.2	0.3	41.5	1.6	4,920.8
1989	49.0	24.4	29.2	44.2	-1.1	1.3	44.4	1.5	5,301.4
1990	50.8	25.3	30.3	45.8	-1.0	2.4	47.2	1.4	5,711.4

SOURCES: CONGRESSIONAL BUDGET OFFICE; U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS; FEDERAL RESERVE BOARD.

Gross-to-Net Adjustment. As noted by Eisner and Pieper, the publicly held debt is not a measure of the net indebtedness of the federal sector. The reason is that the publicly held debt includes neither nondebt liabilities such as life insurance and retirement reserves, nor financial assets such as mortgages, other outstanding loans, and gold reserves.⁷ Not all of these assets and liabilities, however, have the same implication for private net wealth. For example, while federal mortgages and other types of loans represent financial claims on the private sector, federal holdings of gold do not. On the liability side, the perceived private wealth content of life insurance and retirement reserves may be less than that of federal debt securities.

Column (8) of Table 3 shows the separate effect of netting the market value of gold against federal liabilities. Before 1968, the market and official prices of gold were both \$35 per ounce. In 1972, the official price

⁷ Nor does the publicly held debt include the net present value of contingent liabilities such as future Social Security payments and receipts. Including the present value of net social security debt could alter the debt calculation dramatically, but the magnitude depends on uncertain factors such as the choice of an appropriate discount rate. Moreover, when one begins to quantify governmental promises (as opposed to actual financial liabilities), it is difficult to know when to stop. There is probably food stamp "wealth" and research grant "wealth" that some people include in making their spending plans, and some associated capitalized negative wealth from taxation as well. For a discussion of some of the issues raised above, see Rudolph G. Penner, "How Much is Owed by the Federal Government?" Carnegie-Rochester Conference Series on Public Policy: Monetary Regimes and Protectionism (Spring 1982), pp. 233-256.

of gold was raised to \$38, and since 1973 the government has valued its gold holdings at \$42.22 per ounce. Meanwhile, the market price rose from \$35 per ounce in 1967 to \$590 in 1980; at the end of 1984 it was \$308 per ounce. This tremendous increase in the market value of gold since 1967 has far outstripped the rise in the general price level, and means that the government could finance more expenditures per ounce of gold if it were to tap this source of financing. But, unless the gold is sold, the increase in its market value is only a paper capital gain that has no direct effect on the credit market. That is, it does not change the demand or the supply of credit.

Par-to-Market and Cyclical Adjustments. These adjustments conceptually correspond to those described in the previous section. The market value of federal debt is a better measure of what holders of federal debt could consume if they liquidated these assets. The cyclically adjusted debt is a better measure of discretionary debt accumulation.

With regard to the cyclical adjustment, there is an important difference between the one in Table 3 and the one in Table 1. Specifically, the adjustment in Table 3 is based on a trend measure of the GNP, while the adjustment in Table 1 is based on a GNP measure consistent with 6 percent

unemployment.⁸ Since the economy has not on average operated at its potential, a cyclically adjusted debt based on a high-employment benchmark would persistently diverge by an increasing amount from the actual debt over time. The use of trend GNP avoids this problem, because cyclical adjustments in one direction subsequently are offset by cyclical adjustments in the other direction.

SOME CONCEPTUAL ISSUES IN ADJUSTING THE DEFICIT

As the previous section shows, different stories emerge regarding the federal debt and deficit numbers when the conventional measures are modified or adjusted to take into account various factors, such as (a) increased federal financial claims on the private sector, (b) capital gains or losses to holders of federal debt due to interest rate movements, (c) declines in real wealth due to inflation, and (d) the budget effects of the business cycle. This section examines the appropriateness of these adjustments in more detail, suggesting that the appropriateness of such adjustments depends on the question being asked and on the validity of the assumptions

⁸ The reasons for using a trend measure of GNP for calculating the cyclically adjusted debt are discussed in Congressional Budget Office, The Economic and Budget Outlook, Appendix B (February 1984).

regarding public and private sector behavior--that is, the implicit economic model.

The Eisner-Pieper View

According to Eisner and Pieper, "The still dominant view, and we believe the correct one, is that debt and changes in the debt do matter, because they affect private perceptions of wealth and hence affect private spending....From the viewpoint of fundamental and meaningful economic analysis, a proper measure of the government deficit is the increase in real value of government net debt. If the net debt is declining, whether because the government is taking in larger tax revenues than it is spending, or because of the effects of inflation, one should consider the government budget in surplus."⁹

Eisner and Pieper thus argue that the appropriate measure of the deficit is the extent to which the budget (either actively or passively)

⁹ Robert Eisner and Paul J. Pieper, "How to Make Sense of the Deficit," The Public Interest (Winter 1985), pp. 101-118.

affects private wealth.¹⁰ This view implies that the conventional measure of the surplus--revenues minus outlays--must be adjusted for capital gains and losses on assets and liabilities, for increases in the general level of prices, and for federal accumulation of financial claims on the private sector. Also, a cyclical adjustment is necessary to determine discretionary policy changes.¹¹

The Appropriate Treatment of Federal Lending

As noted in Section I, federal lending is reflected in the total budget deficit, and thus accounts for part of the change in publicly held debt.¹² In

¹⁰ The simplified version of the Keynesian model presented in basic textbooks does not take these wealth effects into account. In more elaborate models that do, the wealth effects of federal debt can either augment or diminish the familiar Keynesian effects of federal taxes and spending. According to the debt-neutrality view as developed by Robert Barro, the federal debt does not increase private wealth, and thus the "adjusted deficit" always would be balanced, except for temporary changes in federal purchases. See Robert J. Barro, "Are Government Bonds Net Wealth?" Journal of Political Economy (November/December 1974), pp. 1095-1117.

¹¹ There is an apparent inconsistency, however, in removing the budget effects of fluctuations in real economic activity while bringing in the wealth effects of inflation and interest rate movements stemming from the same cyclical forces.

¹² Most federal lending is reflected in the off-budget deficit, and thus is excluded from the unified budget deficit. However, there is no apparent reason why off-budget lending should be treated differently from on-budget lending. Both give rise to federal borrowing, but neither increases net federal debt. Moreover, it is not clear that on- and off-budget lending have different effects on the allocation of credit between private consumption and capital formation.

contrast, the NIPA measure of the deficit excludes most federal lending.¹³ The "adjusted deficit" measure calculated by Eisner and Pieper is designed to exclude federal lending programs because these programs generally do not add to private net wealth. Therefore, their basic (unadjusted) measure of the deficit is a NIPA concept.

Commenting on the appropriate treatment of federal lending, the President's Commission on Budget Concepts in 1967 stated, "A breakdown between loans and other expenditures within the budget is so important, particularly for analyzing the impact of the budget on income and employment, that the summary budget presentation should show most direct loans (on the basis of their unsubsidized value) separately from other expenditures. A surplus or deficit should therefore be presented in the budget to be calculated by comparing expenditures other than loans with total budget receipts, for purposes of providing a measure of the economic impact of federal programs. However, the subsidy element in all such loans should be included and explicitly disclosed in the expenditure rather than in the loan account of the budget, to the extent practicable, since such subsidies are much more like grants than loans."

¹³ An important exception is the nonrecourse loans to farmers by the Commodity Credit Corporation.

This statement clearly reflects the view that debt-financed federal lending has a different economic impact from other types of debt-financed spending. Presumably, the impact of federal lending is negligible when it merely substitutes for nonfederal borrowing that otherwise would have taken place. In such a case, the federal government is acting solely as a financial intermediary. However, to the extent that federal lending programs entail a subsidy, the associated increase in federal debt is not matched by an increase in federal claims on the private sector. In the Keynesian model, such subsidies could be viewed as grants or transfer payments which are assumed to increase aggregate demand. In contrast, according to the debt-neutrality view, transfers would not affect consumption, except perhaps for redistribution effects among groups with different propensities to consume. In any event, although the present value of the subsidy component of new loans may be as much as 20 percent to 50 percent of federal lending each year, a single measure of the deficit that excludes federal lending would seem more appropriate than a single measure that includes all federal lending. The alternative--substituting a direct measure of subsidies--is not possible at this time because the required data are not available.¹⁴

¹⁴ The appropriate budget treatment of federal lending is discussed in Congressional Budget Office, New Approaches to the Budgetary Treatment of Federal Credit Assistance (March 1984).

The Appropriate Treatment of Capital Gains

Capital gains and losses on federal debt appear neither in the NIPA measure of the deficit nor in the change in publicly held debt. Whether or not such gains or losses should be part of the deficit measure depends on the validity of the underlying macroeconomic model assumed. In this regard, several points should be noted.

First, the view that a dollar decline in the market value of federal debt should be treated as a dollar offset to the federal deficit assumes that federal taxes, expenditures, and capital gains or losses on federal debt all have the same impact on private spending with the sign of the effects depending on the private wealth effects.¹⁵ However, according to the permanent-income theory of consumption, capital gains would increase consumption only to the extent they are perceived as affecting permanent income--generally defined as the present value of all future income from labor and wealth holdings. Such capital gains are probably viewed as more transitory in nature than would a major change in taxation, for example.

¹⁵ For a long time, it has been argued that federal taxes and spending should be given different weights for measuring the economic effects of the federal deficit. In this regard, Blinder and Goldfeld note that the relative magnitude of such weights on taxes and spending can differ from one economic model to another. See Alan S. Blinder and Stephen Goldfeld, "New Measures of Fiscal and Monetary Policy, 1958-73," American Economic Review, vol. 66, no. 5 (December 1976).

Moreover, individuals may choose not to adjust their rate of discount whenever market rates of interest change. Finally, a considerable portion of private wealth is held in pension and insurance reserves whose variations in value are often unknown to the ultimate beneficiaries. As a result, variations in the measured ratio of the market-to-par value of federal debt may not all be perceived as a change in private wealth.

Second, Eisner and Pieper use observed price changes rather than a measure of expected price changes to calculate the decline in the real value of federal debt resulting from inflation. But, as suggested above, the private saving response to unanticipated (and uncompensated) capital losses may be much smaller than the response to anticipated (and compensated) losses. Of course, a justification for using observed rather than expected inflation rates is that the latter are difficult to measure with much certainty.¹⁶

Finally, in computing capital gains resulting from inflation and movements in nominal interest rates, care must be taken to avoid double counting. That is, increased inflation erodes the real market value of federal debt by raising nominal interest rates and also by reducing the

¹⁶ As a proxy for expected inflation, some researchers have used the nominal rate of interest in excess of 3 percent (an assumed real rate of interest). For example, see Phillip Cagan, "The Real Federal Deficit and Financial Markets," AEI Economist (November 1981).

purchasing power of money. Eisner and Pieper attempt to avoid double counting by calculating the inflation-related decline in the real market value of federal debt rather than the decline in the real par value.

IMPLICATIONS FOR FISCAL POLICY

What are the policy implications of the adjusted debt and deficit amounts presented in this paper? As indicated above, the answer depends on what question is being asked and on what model of economic behavior is assumed to be the correct one.

If one adopts the Eisner-Pieper view of the economy, which assumes that the effect of discretionary budget deficits on private wealth is of primary importance to changes in real output and employment, then the adjusted debt and deficit amounts may provide a better answer to questions regarding fiscal stimulus than do the unadjusted amounts.¹⁷ However, most current concerns about large deficits center on their effect on interest rates and inflation. To the extent that one wishes to use a federal deficit measure to gauge the influence of the federal government on interest rates and inflation, rather than its influence on aggregate demand, there is a problem with using the adjusted measures. Specifically, to the extent that deficits raise inflation and interest rates, those effects will reduce the

¹⁷ On the other hand, if one assumes a model in which the wealth effects are not important, then the unadjusted amounts are more relevant.

Eisner-Pieper measure of the adjusted deficit by causing capital losses for holders of federal debt. As a result, the adjusted deficit measure would understate the credit market implications of fiscal policy, because of the inflation and interest rate effects of the actual deficit.¹⁸

Even in a model that stresses the private wealth effects of federal deficits, the aggregate demand effects of fiscal policy are ambiguous. The reason is that while an increase in private wealth adds to consumption demand, it also may increase the demand for money. Unless the increased demand for money is satisfied with an increase in supply by the Federal Reserve, interest rates will rise and crowd out interest-sensitive private spending. As a result, the increase in aggregate demand could be negligible, even if the effect on consumption is substantial.¹⁹ This outcome is more likely when, as now, the Federal Reserve is targeting the growth of the monetary aggregates.

A similar caveat holds for an open-economy model if deficits, by putting upward pressure on interest rates, result in dollar appreciation,

¹⁸ Moreover, there is less disagreement among alternative macro-economic models about the impact of deficits on interest rates than about the impact of fiscal stimulus on real output and employment.

¹⁹ For a discussion of this issue, see Alan S. Blinder and Robert M. Solow, "Analytical Foundations of Fiscal Policy," in Brookings Institution, The Economics of Public Finance (Washington, D.C.: Brookings Institution, 1974).

reduced net exports, and larger dollar-denominated wealth holdings by foreigners. In this case, the effects on both interest rates and output could be small, despite an apparent increase in domestic private wealth measured by the deficit. Here the deficit should be reduced for increases in foreign holdings of dollar-denominated financial assets.

Finally, increased attention has been given recently to the effects of expected future deficits. If these expectation effects are important, then current and past deficits--whether or not adjusted for inflation, interest rate movements, and cyclical effects--do not provide a satisfactory gauge of fiscal policy effects. In such a model, some measure of expected deficits is appropriate. Whether these expected deficits should be adjusted or unadjusted depends on the assumptions embodied in the model.

Because current concerns focus on the effects of the deficit on interest rates rather than on output, and because of the amount of uncertainty regarding the correct macroeconomic model and the magnitude of important parameters, a conservative assessment of the policy implications of the adjusted debt and deficit numbers is that these adjusted measures represent a conceptual refinement but not necessarily a quantitatively better gauge of fiscal policy effects. That is, even if one assigns an important role to wealth effects, the adjusted measures presented in this paper may understate the economically relevant size of the debt and deficit

by as much or more than it is overstated by the unadjusted measures. In other words, the best measure probably is somewhere between the adjusted and unadjusted amounts and includes only pertinent effects on wealth. No consensus exists about which ones are pertinent and significant.²⁰

In any case, it is clear that during the 1980s both the adjusted and unadjusted numbers show deficits that are very large compared to history, and a debt-to-GNP ratio that rises substantially in contrast to earlier decades. Whatever distortions may have been caused by viewing fiscal policy of the past through unadjusted lenses, the adjustments proposed by Eisner and Pieper do not change the fundamental interpretation of the conventional view of the future.

²⁰ . If one assigns a relatively low weight to the inflation adjustment, then the adjusted deficit shows basically the same story as does the CBO estimate of the structural deficit—that is, a rising deficit-to-GNP ratio throughout the 1980s.

APPENDIX

This technical appendix describes the methodology used to calculate the various adjustments to the federal deficit and debt presented in this paper.

RECONCILIATION OF GROSS PUBLIC DEBT AND NET FEDERAL DEBT

Table A-1 shows the adjustments that were made to compute the net federal debt for 1983 and 1984. This concept differs from the gross measure of the debt mainly because federal liabilities other than public debt are included and federal assets are netted against total federal liabilities. Also, the net measure excludes debt held by government accounts. ^{1/}

As shown in Table A-1, Federal Reserve assets and liabilities are virtually offsetting, while credit agency assets are only slightly above credit agency liabilities. Therefore, after netting out debt held by government accounts, the main difference between gross debt and net debt reflects the fact that federal government financial assets exceed its nondebt liabilities. Most of the government's financial assets represent mortgages and other types of loans--a substantial portion of which are to foreigners. Most of its liabilities, other than credit market debt, represent life insurance and retirement reserves.

The changes from 1983-1984 in gross and net debt are also shown in Table A-1. These changes can be used to compute a gross-to-net adjustment to the deficit. More specifically, the deficit can be reduced by the amount to which the increase in gross debt exceeds the increase in net debt. Such a deficit measure would net out the acquisition of financial assets. In computing their adjusted deficit, Eisner and Pieper do not include an explicit gross-to-net adjustment. Instead, they base their measure on the NIPA concept of the federal deficit, which effectively incorporates such an adjustment. CBO has followed their procedure in Tables 1 and 2 of the main text.

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1. Gross public debt includes Treasury debt held by federal accounts. In contrast publicly held federal debt excludes federal holdings of Treasury debt and includes public holdings of agency debt. In Tables 3 and 4 of the main text, the calculations begin with publicly held federal debt instead of gross public debt.

TABLE A-1. RECONCILIATION OF GROSS PUBLIC DEBT AND NET FEDERAL DEBT (End of calendar year, in billions of dollars)

	<u>1983</u>	<u>1984</u>	<u>Change 1983-1984</u>
A. Gross Public Debt	1410.7	1663.0	252.3
+Other Liabilities of the Federal Government	163.1	184.1	21.0
+Liabilities of Credit Agencies	245.3	285.8	40.5
+Liabilities of Federal Reserve	203.9	218.4	14.5
-Debt Held by Federal Government	236.3	289.6	53.3
=Total U.S. Government Liabilities	1786.7	2061.7	275.0
B. Federal Government Financial Assets	276.1	303.7	27.6
+Credit Agency Assets	257.3	298.4	41.1
+Federal Reserve Assets	203.9	218.4	14.5
=Total U.S. Government Financial Assets	737.3	820.5	83.2
C. U.S. Government Net Debt	1049.4	1241.3	191.9
<u>Memorandum:</u>			
Publicly Held Federal Debt ^{a/}	1177.9	1376.8	198.9

Source: Board of Governors of the Federal Reserve System.

- a. The publicly held federal debt differs from the gross public debt in that it excludes Treasury debt held by government accounts and includes agency debt held by the public.

RECONCILIATION OF PAR AND MARKET VALUES OF NET DEBT

Table A-2 shows the par-to-market value adjustments to the net debt for 1983 and 1984. The market value of each asset and liability was calculated as:

$$K_{t,i}^M = MP_{t,i} \cdot K_{t,i}^P$$

where: $K_{t,i}^M$ = the market value of asset (liability) i at the end of year t

$MP_{t,i}$ = the market-to-par ratio,

$K_{t,i}^P$ = the par value of asset (liability) i at the end of year t.

In 1984, the total par-to-market adjustment reflects an upward revaluation of \$1.4 billion on the sum of the following net liabilities: savings bonds, Treasury debt other than savings bonds, and agency debt. An upward revaluation of \$69.9 billion for gold, and a downward revaluation of \$10.0 billion on other financial assets (mainly mortgage holdings) are also reflected. For all other assets and liabilities, the market value was assumed to equal the par value--the same assumption adopted by Eisner and Pieper. If the par-to-market adjustment for gold was not taken into account, the par-to-market conversion of the net debt in 1984 would amount to an upward adjustment of \$11.4 billion instead of a downward adjustment of \$58.5 billion.

The year-to-year changes in par and market values of net debt (excluding gold) were used to compute a par-to-market adjustment for the deficit. That is, the deficit was reduced by the amount to which the increase in the par value of net debt exceeded the increase in the market value. In algebraic terms, this "interest rate effect" (IRE) for each asset and liability was computed as:

$$\begin{aligned} IRE_t &= (1-MP_{t,i}) K_{t,i}^P - (1-MP_{t-1,i}) K_{t-1,i}^P \\ &= \Delta K_{t,i}^P - \Delta K_{t,i}^M \end{aligned}$$

In 1984, this adjustment raised the deficit by \$12.7 billion.

To test the sensitivity of the projected par-to-market adjustments, two alternative estimating procedures were used--one proposed by Eisner

**TABLE A-2. RECONCILIATION OF PAR AND MARKET VALUE OF NET
FEDERAL DEBT (End of calendar year, in billions of dollars)**

	<u>1983</u>	<u>1984</u>	<u>Change 1983-1984</u>
A. Total U.S. Government Liabilities			
at Par Value	1786.6	2061.8	275.2
+Par-to-Market Conversion	-21.7	1.4	23.1
=Total U.S. Government Liabilities at Market Value	1764.9	2063.2	298.3
B. Total U.S. Government Financial			
Assets at Par Value	737.3	820.5	83.2
+Par-to Market Conversion			
On Gold	89.9	69.9	-20.0
On other financial assets	-20.5	-10.0	10.5
=Total U.S. Government Financed Assets at Market Value	806.7	880.4	73.7
C. Net Federal Debt at Par Value	1049.4	1241.3	191.9
+Par-to-Market Conversion	-91.1	-58.5	32.6
=Net Federal Debt at Market Value	958.3	1182.8	224.5

SOURCE: Congressional Budget Office. The par-to-market adjustments were based on data provided by W. Michael Cox of the Federal Reserve Bank of Dallas, and on the methodology used by Eisner and Pieper.

and Pieper and one suggested by Butkiewicz. 2/ Table A-3 shows the par-to-market adjustments based on these two approaches.

Despite fairly large differences between these sets of estimates in some years, the adjustments are small compared to the unadjusted deficit and debt projections. Moreover, the adjustments are close at the end of the projection period. (The adjustments shown in the main text are based on the Eisner-Pieper approach.)

Table A-4 shows the market-to-par indices for bills, notes, and bonds that underlie the adjustments reported in Table A-3. The indices projected with the Eisner-Pieper method exhibit little variation, and thus the par-to-market adjustments to the deficit are small in Table A-3. The greater variation in the indices produced with the Butkiewicz method reflects greater movements in average coupon rates rather than in market rates of interest. This greater variation in the estimated indices produces the larger par-to-market adjustments to the deficits in Table A-3. Finally, since the indices for bills, notes, and bonds generally are higher when calculated with the Butkiewicz method, the corresponding adjustments to the debt numbers are also larger.

ACCOUNTING FOR INFLATION

Eisner and Pieper stress the need to adjust the deficit for the decline in the real value of debt resulting from inflation. The calculation of this adjustment was based on the following equation:

$$IE_t = (((P_{t,end}/P_{t-1,end}) - 1) D_{t-1}^{N,M} + ((P_{t,end}/P_t) - 1) (D_t^{N,M} - D_{t-1}^{N,M})) \cdot P_t/P_{t,end}$$

where: IE_t = inflation adjustment for year t

P_t = GNP deflation for year t

2. The Eisner-Pieper procedure is discussed in an unpublished document kindly provided by the authors. This method is based on equations relating the market-to-par indices computed by Cox and Hirschhorn to market rates of interest. (See W. Michael Cox and Eric Hirschhorn, "The Market Value of the U.S. Government Debt: Monthly, 1942-1980," Journal of Monetary Economics (March 1983), pp. 261-272. The Butkiewicz procedure is described in James L. Butkiewicz, "The Market Value of Federal Debt," Journal of Monetary Economics (May 1982), pp. 373-380. In the Butkiewicz approach, the market-to-par ratio (MP) is approximated as $MP = (1 + nc)/(1 + nr)$, where n is the average term to maturity of the security, c is the coupon rate, and r is the yield to maturity.

TABLE A-3. ALTERNATIVE ESTIMATES OF THE PAR-TO-MARKET EFFECT
(By calendar year, in billions of dollars)

Year	<u>Eisner-Pieper Method</u>		<u>Butkiewicz Method</u>	
	<u>Deficit</u>	<u>Debt</u> ^{a/}	<u>Deficit</u>	<u>Debt</u> ^{a/}
1984	12.7	11.4	12.7	11.4
1985	-3.4	8.1	11.3	22.7
1986	0.6	8.7	2.2	24.9
1987	0.8	9.5	6.3	31.2
1988	0.6	10.0	-11.9	19.2
1989	0.7	10.8	-5.4	13.8
1990	1.0	11.7	-1.8	12.0

SOURCE: Congressional Budget Office. The 1984 numbers are based on market-to-par indices provided by W. Michael Cox of the Federal Reserve Bank of Dallas, and on the methodology used by Eisner and Pieper.

- a. These adjustments exclude a par-to-market adjustment on gold amounting to \$69.9 billion in each year, which is included in the par-to-market adjustments shown in Tables 3 and 4 of the main text. For the projection period, the quantity of gold held by the federal government and the market price of gold were assumed to remain at their 1984 levels.

TABLE A-4. ALTERNATIVE ESTIMATES OF MARKET-TO-PAR INDICES
(Ratio of market-to-par values, in decimals)

Year	<u>Eisner-Pieper Method</u>			<u>Butkiewicz Method</u>		
	<u>Bills</u>	<u>Notes</u>	<u>Bonds</u>	<u>Bills</u>	<u>Notes</u>	<u>Bonds</u>
1984	.9754	1.0219	.9512	.9754	1.0219	.9512
1985	.9995	1.0086	.9588	1.0034	1.0194	1.0003
1986	.9998	1.0086	.9591	1.0064	1.0172	1.0185
1987	1.0000	1.0086	.9593	1.0062	1.0182	1.0327
1988	1.0000	1.0085	.9594	1.0060	1.0089	1.0280
1989	1.0000	1.0084	.9594	1.0060	1.0049	1.0242
1990	1.0000	1.0084	.9594	1.0060	1.0033	1.0230

SOURCE: Congressional Budget Office. The indices for 1984 were provided by W. Michael Cox of the Federal Reserve Bank of Dallas.

$P_{t,end}$ = average of GNP deflator for fourth quarter of year t and first quarter of year t+1

$D_t^{N,M}$ = market value of net debt at end of year t.

Essentially, IE_t is the rate of inflation times the market value of net debt at the beginning of the period plus an inflation adjustment for the flow, with both terms converted to current dollars. The market value of debt was used instead of the par value to avoid double counting of the effects of inflation which also are reflected in interest rate movements.

RECONCILING THE UNADJUSTED AND ADJUSTED DEFICITS

The change in the real market value of net debt equals the conventional deficit adjusted for interest rate and inflation effects. That is,

$$\Delta K^A = \Delta K^P + IE - IRE$$

where:

ΔK^A = adjusted deficit (change in real value of net debt)

ΔK^P = conventional deficit (change in par value of net debt),

IE = inflation effect (negative in value)

IRE = interest rate effect.

The derivation is as follows. Define

$$\Delta K^P = K_t^P - K_{t-1}^P$$

$$IRE = (1-MP_t) K_t^P - (1-MP_{t-1}) K_{t-1}^P, \text{ and}$$

$$IE = (P_t/P_{t,end})(MP_t \cdot K_t^P) - (P_{t,end}/P_{t-1,end})(MP_{t-1} \cdot K_{t-1}^P) \\ - (P_{t,end}/P_t)(MP_t \cdot K_t^P - MP_{t-1} \cdot K_{t-1}^P)$$

Then, the interest-rate corrected deficit is

$$\Delta K^P - IRE = MP_t \cdot K_t^P - MP_{t-1} \cdot K_{t-1}^P$$

which is the negative of the last term for IE , after the equation for IE is multiplied through by $(P_t/P_{t,end})$.

Thus, the deficit adjusted for inflation and interest rate movements is

$$\begin{aligned}\Delta K_t^I - IRE + IE &= (P_t/P_{t,end})(MP_t \cdot K_t^P) - (P_{t,end}/P_{t-1,end})(MP_{t-1} \cdot K_{t-1}^P) \\ &= P_t((MP_t \cdot K_t^P/P_{t,end}) - (MP_{t-1} \cdot K_{t-1}^P/P_{t-1,end}))\end{aligned}$$

The term in the double parentheses is the change in the real market value of debt. Multiplying by P_t converts this change to current year average prices to make it consistent with the nominal value of the unadjusted deficit. Double counting of the inflation effect does not occur since the adjustments to the unadjusted deficit yield the change in the real market value of the net debt, expressed in current year average prices.

