

# Measuring and Analyzing the Cyclically Adjusted Budget

Frank de Leeuw and Thomas M. Holloway\*

There is continuing strong interest in partitioning the federal budget into a cyclical component, measuring the automatic responses of receipts and expenditures to economic fluctuations, and a cyclically adjusted or "structural" component, measuring discretionary fiscal policy and other non-cyclical factors affecting the budget.<sup>1</sup> Reasons for this interest vary. The current concern of the Office of Management and Budget is that "the prospect of a permanently large structural deficit problem is likely to have a significant adverse impact on capital formation and economic growth during the period ahead."<sup>2</sup> As recently as 1981, however, the Council of Economic Advisers referred to the growth in the high-employment deficit from 1979 to 1980 as an "apparent move toward expansion."<sup>3</sup>

Not only do views about the effects of deficits vary, but measures of the size of cyclically adjusted budgets also vary enormously, as Chart 1 illustrates. BEA's published high-employment budget, which measures what the budget would be at a 4.9 percent unemployment rate, shows a deficit of 1.5 percent of high-employment GNP in calendar year 1983. A high-employment budget based on a 6 percent unemployment rate shows a 1983 deficit of 2.5 percent of the corresponding high-employment GNP. The cyclically adjusted budget we will emphasize in this paper, based on a "mid-expansion trend" GNP, shows a 1983 deficit of 4.0 percent of the corresponding trend GNP. Finally, the actual deficit is 5.6 percent of actual GNP in 1983.<sup>4</sup>

We make no attempt in this paper to choose among the various views about how the federal budget affects the economy. The paper is an example not of measurement without theory but of measurement with several theories of uncertain standing. Our hope is that careful measurement will eventually contribute to choosing among the theories.

\*Frank de Leeuw is Chief Statistician and Thomas M. Holloway is an Economist, both at the Bureau of Economic Analysis. A slightly different version of this paper appeared in the *Survey of Current Business* 63(December 1983). The authors have benefited from comments by Darrel Cohen, Edward Gramlich, George Jaszi, Joseph Pechman, and the late William Fellner. The ideas of James Tobin strongly influenced the sections dealing with debt, including Appendix 1. Views expressed in the paper are the authors'.

<sup>1</sup>The Administration used the term "structural" in the *Budget of the United States Government—Fiscal Year 1984*, pp. 2-16 to 2-19. We will use the more descriptive term, "cyclically adjusted" in the remainder of this paper.

<sup>2</sup>*Budget of the United States Government—Fiscal Year 1984*, pp. 2-16 to 2-17.

<sup>3</sup>*Economic Report of the President* (January 1981), p. 156.

<sup>4</sup>All these measures are on a national income and product accounts (NIPAs) basis. Still other cyclically adjusted budgets are presented in Congressional Budget Office, *The Outlook for Economic Recovery—Part 1* (February 1983), pp. 67-9.

In the first part of the paper we discuss the measurement of a cyclically adjusted budget, emphasizing the selection of a reference trend for real GNP. We review four uses of cyclically adjusted budgets, and then propose a budget based on a new reference trend drawn through GNP in middle expansion periods, in place of the traditional reliance on potential GNP.

In the second part of the paper we analyze the sources of change in the cyclically adjusted budget based on mid-expansion trend GNP. We also present some results for a high-employment budget based on a 6 percent unemployment rate. We relate the cyclically adjusted budget, using accounting identities, to changes in the ratio of cyclically adjusted federal debt to trend GNP—a ratio that we believe should occupy a central place in current concerns about the budget. Changes in that ratio depend on cyclically adjusted expenditures and receipts, on the growth rate of trend GNP, on an average interest rate, and on federal balance-sheet items such as net lending.

To conclude the paper, we derive the implications of possible combinations of deficits, growth rates, and interest rates for the future ratio of federal debt to GNP.

A four-equation macroeconomic model is shown in Appendix 1 to clarify the logical relation between the expansionary-contractionary effects and the crowding-out effects of fiscal policy, and between the deficit and the debt as measures of fiscal policy.

Some of the paper's highlights are these:

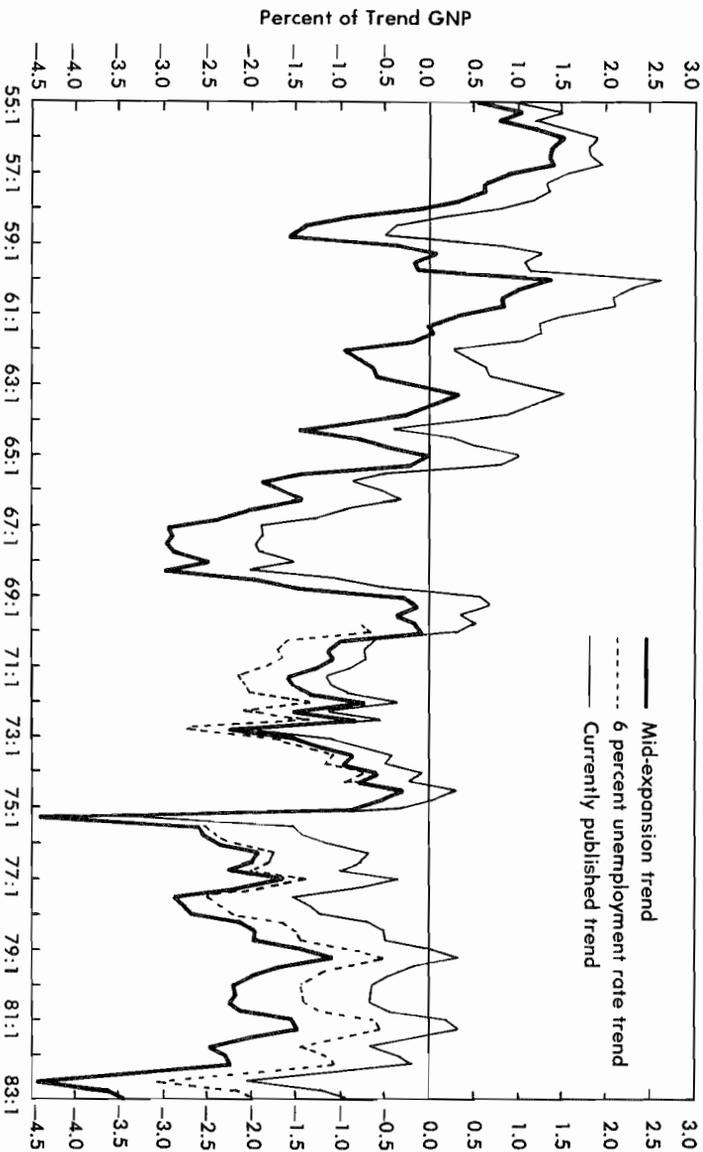
- As we have already seen in Chart 1, our preferred measure of the cyclically adjusted deficit reached 4 percent of trend GNP in 1983, far higher than in any earlier year;
- The ratio of cyclically adjusted debt to trend GNP—a ratio that we believe is more relevant than deficit-to-GNP ratios to current budget concerns about crowding out—rose from 1981 to 1983, in contrast to a continual fall from the end of World War II to the early 1970s;
- The differential between the interest rate on federal debt and the growth rate of GNP contributed as much as explicit decisions about federal receipts and expenditures to the rise in the debt-to-GNP ratio;
- Explicit decisions about federal receipts and expenditures that had the biggest influence on the 1981–83 rise in the debt were cuts in personal income taxes and corporate profits taxes and higher defense spending;
- Under a wide range of assumptions about interest rates, GNP growth rates, and budget decisions, the ratio of cyclically adjusted federal debt to GNP will continue to rise from 1983 to 1988.

## **I. Measurement of a Cyclically Adjusted Budget**

To construct a cyclically adjusted budget, the essential steps are (1) determining the responsiveness (under current legislation) of each category of receipts and expenditures to short-run movements in GNP (e.g., cyclical tax elasticities), (2) choosing a reference trend for GNP free from short-run fluctuations, (3) applying the responses from step 1 to gaps between trend GNP and actual GNP, and (4) adding the expenditures and receipts “gross-ups”

Chart 1

Cyclically Adjusted Federal Surplus/Deficit  
as a Percent of Trend GNP



from step 3 to the actual budget to obtain a cyclically adjusted budget.<sup>5</sup> The second step, selecting a GNP reference trend, is the most important and controversial. Other things being equal, the higher the reference trend, the smaller the cyclically adjusted deficit.

In the past, the usual procedure has been to construct a high-employment or potential GNP trend based on assumed high-employment levels of the labor force, productivity, and the unemployment rate. An alternative—one that we will end up recommending and using—is to base a reference trend on movements of actual GNP after filtering out cyclical fluctuations. Differences between the two are sometimes large. Since the choice between them should depend on why and how cyclically adjusted budgets are used, we begin this section with a review of four approaches to using cyclically adjusted budgets and their implications for measuring a reference trend.

#### A. *Uses of a Cyclically Adjusted Budget*

1. *The CED guideline for the surplus/deficit.*—The Committee for Economic Development (CED) first devised the full-employment budget soon after the end of World War II on the theory that a small surplus in that budget would ensure a high level of national saving while permitting built-in stabilizers to damp short-run fluctuations.<sup>6</sup> The CED policy rule in its original form has not attracted attention for many years, but the idea of fiscal guidelines related to a cyclically adjusted budget persists. The latest edition of Brookings' *Setting National Priorities*, for example, states:

The deficit that would remain if the economy were operating at a high level is called the *structural* or *high-employment* deficit, two terms that are used interchangeably. . . . Reduction or elimination of this deficit as the economy recovers would increase national saving and permit a larger increase in investment, which would in turn help to stimulate productivity.<sup>7</sup>

The GNP trend called for by this use is one that represents highest possible utilization of resources without accelerating inflation—an extraordinarily difficult concept to estimate. Moreover, the exact level of the trend clearly matters. Balancing a cyclically adjusted budget based on a GNP reference trend associated with a 7 percent unemployment rate, for example, would call for an actual current deficit \$25 to \$30 billion smaller than balancing a cyclically adjusted budget associated with a 6 percent unemployment rate.

<sup>5</sup>For a detailed description, see Frank de Leeuw, Thomas M. Holloway, Darwin G. Johnson, David S. McClain, and Charles A. Waite, "The High-Employment Budget: New Estimates, 1955-80," *Survey of Current Business*, 60 (November 1980), pp. 15-21, 31-43.

<sup>6</sup>*Taxes and the Budget: A Program for Prosperity in a Free Economy* (New York: Committee for Economic Development, 1947).

<sup>7</sup>Joseph A. Pechman, editor, *Setting National Priorities: The 1984 Budget* (Washington, D.C.: The Brookings Institution, 1983), pp. 32-33. Pechman uses an estimate of the high-employment deficit associated with a 6 percent unemployment rate.

2. *A measure of discretionary fiscal policy.* — Probably the most widespread use of a cyclically adjusted budget has been to measure the short-run expansionary or contractionary thrust of fiscal policy. The major reason for using the cyclically adjusted rather than the actual surplus or deficit for this purpose stems from what can be described as a simultaneous-equations problem. One equation—the one of fundamental interest—relates economic activity to the federal budget (and other forces such as monetary policy). The other equation relates the federal budget to economic activity (and other forces such as new legislation). Trying to estimate the first relationship using the actual budget can lead to serious bias, especially in a period when the budget reflects mainly changes in economic activity rather than changes in legislation. A cyclically adjusted budget removes the effect of changing economic activity and eliminates this source of bias in the analysis.<sup>8</sup>

The level of the GNP reference trend called for by this use is not particularly important; two trends that differ only in level will lead to similar analytical conclusions about the impact of fiscal policy. What is important is that movements in the trend should *not* be highly sensitive to GNP movements that may themselves be due to fiscal policy; for if they are then the simultaneous-equations problem remains. If a prolonged boom or a deep recession is caused by fiscal policy, in other words, that boom or recession should not influence the GNP trend.

<sup>8</sup>Using the determination of national income as an example, the two equations noted in the paragraph, omitting time subscripts, are:

$$(1) Y = a_0 + a_1 DF + a_2 O_1 + u_1$$

$$(2) DF = b_0 + b_1 Y + b_2 O_2 + u_2$$

where:

Y	=	actual GNP;
DF	=	actual deficit;
O <sub>1</sub>	=	other factors affecting GNP;
O <sub>2</sub>	=	other factors affecting the deficit;
u <sub>1</sub> , u <sub>2</sub>	=	error terms.

Since  $b_1$  is significantly negative,  $a_1$  will also tend to be negative when  $O_2$  and  $u_2$  vary little. If a cyclically adjusted trend value,  $Y^*$ , is substituted for  $Y$ , the cyclically adjusted deficit,  $DF^*$ , is:

$$(3) DF^* = b_0 + b_1 Y^* + b_2 O_2 + u_2$$

which implies that:

$$(4) DF = DF^* + b_1 (Y - Y^*).$$

Substituting equation (4) into equation (1),

$$(5) Y = a_0 + a_1 DF^* + a_2 O_1 + a_1 b_1 Y - a_1 b_1 Y^* + u_1$$

Bringing  $a_1 b_1 Y$  to the left-hand side, equation (5) can be solved for  $Y$ . Reduced-form estimates of equation (5) will not have the bias likely in equation (1). One further point is that  $Y^*$  remains on the right-hand side of equation (5). Most reduced-form studies do not include this term—an omission, according to the analysis above.

3. *A measure of potential crowding out.* — As noted earlier in the reference from the Administration's 1984 *Budget*, a current concern about large deficits is that they will interfere with long-term domestic growth. A related concern is that the high interest rates they entail will attract foreign saving, reducing growth in other countries rather than domestic growth.<sup>9</sup>

This view of the effects of deficits may be, but is not necessarily, inconsistent with the view that they are expansionary. The view that deficits have short-run expansionary effects is equivalent to the hypothesis that the cyclically adjusted deficit has a positive coefficient in a reduced-form equation for GNP or some other measure of economic activity. The view that deficits curb productivity and growth in the long run is equivalent to the hypothesis that the deficit has a negative coefficient in a reduced-form equation for the long-run rate of growth of the capital stock relative to output. Appendix I explores the issue with the aid of a theoretical macroeconomic model.

Analysis of the possible long-run crowding out effects of the federal budget makes more sense in terms of the *stock* of federal debt than the federal surplus or deficit. It is a reduced capital stock that may curtail further growth; and it is the stock of government securities, not current government deficits, that is a substitute for capital stock in the public's asset portfolio. Appendix I also analyzes this issue.

The choice between the flow of deficits and the stock of debt makes a big difference. The deficit as a fraction of GNP can be rising while the debt as a fraction of GNP is falling—any combination of increases and decreases in the two ratios is possible. If it is the debt-to-GNP ratio that we suspect may have an eventual impact on productivity and growth, then we should be focusing attention not on the deficit (in dollars or as a fraction of GNP) but on the growth of cyclically adjusted debt relative to cyclically adjusted GNP.<sup>10</sup>

The GNP reference trend called for by this use should remove short-run cyclical fluctuations, but should not alter the *average* level of GNP over any sustained period. One compelling reason for preserving the average level is that a deviation of GNP from trend, while it affects the surplus or deficit only during the quarter of the deviation, affects a cyclically adjusted measure of debt for that quarter *and all future quarters* because of cumulation. Unless positive and negative deviations of GNP from trend are approximately offsetting, therefore, a measure of cyclically adjusted debt can deviate permanently from actual debt because of some long-past fluctuations. For example, if we were to cumulate cyclically adjusted deficits starting in 1970 based on a GNP trend corresponding to a 6 percent unemployment rate, the cyclically adjusted debt would now be more than \$100 billion below actual debt even if the economy were to return to a 6 percent unemployment rate immediately and stay there. Such a debt measure would be a poor guide to the portfolio position of the public.

<sup>9</sup>*Economic Report of the President* (February 1983), pp. 62-4, 69-70.

<sup>10</sup>Focusing on changes in the cyclically adjusted debt-to-GNP ratio is similar to adjusting the high-employment surplus/deficit by substituting real interest payments for nominal interest payments to take into account changes in the real value of outstanding public debt. This adjustment was recently examined by Robert Eisner and Paul J. Pieper, "A New View of the Federal Debt and Budget Deficits" (mimeo, 1983).

4. *An atheoretical measure of budget trends.*—The three uses discussed so far are all related to some theoretical view about how fiscal policies influence the economy. A fourth use is not associated with any economic theory; cyclical fluctuations in receipts and expenditures are simply treated as one source of “noise” to be filtered out. For example, a comparison of actual expenditures in a boom year with those in a recession year will often give a misleading indication of budget trends. Comparing cyclically adjusted spending in the two years will give a more accurate picture. Cyclical adjustment, in this view, is analogous to seasonal adjustment. Just as we learn more about what is happening to the economy currently by examining seasonally adjusted numbers than by examining unadjusted numbers, we learn more about what is happening to the budget by examining cyclically adjusted numbers than by examining unadjusted numbers.

The GNP trend appropriate for this use is clearly a path that eliminates cyclical fluctuations but preserves average levels. One such trend, suggested by John Cochrane of the staff of the Council of Economic Advisers, is a weighted moving average of actual GNP, analogous to the initial estimate of the cycle-trend in seasonal adjustment. Another such trend, suggested by William Fellner, is constructed by calculating trough-to-trough or peak-to-peak averages of GNP, placing them at the center of the time-spans they cover, and connecting them by smooth-growth lines. In both cases, positive and negative deviations of GNP from trend will offset over any extended period.

#### B. *A “Mid-Expansion” Reference Trend to Estimate a New Cyclically Adjusted Budget*

The reference trend proposed in this paper, and used to calculate a new cyclically adjusted budget, is one that smoothly connects real GNP averages in mid-periods of economic expansions. Each quarterly value of real GNP is classified into one of four phases: recession, early expansion (recovery), middle expansion, and late expansion (not every cycle has a late expansion, as we shall see in a moment; in the 1930s, one cycle did not even achieve a middle expansion). The mean level of GNP during each middle expansion, placed at the center of that middle expansion, is one point on the proposed reference trend.<sup>11</sup> Mid-expansion averages are then connected by constant-growth-rate lines to complete the reference trend.

A mid-expansion trend reflects the path of actual GNP, not the path of a hypothetical potential GNP.<sup>12</sup> It does *not* necessarily represent high employment without accelerating inflation; therefore, a budget based on a mid-expansion trend is not suitable for the old CED use of setting budget targets. It is, however, suitable for filtering out cyclical “noise” and for developing a measure of cyclically adjusted debt. Furthermore, by discarding periods of prolonged boom or deep recession, it is unlikely to be heavily

<sup>11</sup>A geometric mean is used in this step.

<sup>12</sup>The CEA potential GNP series is the reference trend for the BEA high-employment budget and is described in *Economic Report of the President* (January 1981) pp. 180-1.

influenced by GNP movements that are themselves due to fiscal policy. It is therefore more suitable for measuring the expansionary/contractionary thrust of fiscal policy than moving averages or entire-cycle averages. Overall, mid-expansion trend GNP provides a useful reference on which to base a cyclically adjusted budget.

Estimating the mid-expansion trend begins with delineation of four cyclical phases. Recessions, the first of the four phases, have been demarcated by the NBER.<sup>13</sup> The second phase, early expansion or recovery, is defined as the period from the beginning of an upturn until real GNP reaches its previous peak. Middle expansion is defined as the 12 quarters beginning when real GNP passes its pre-recession peak—unless a downturn begins during those 12 quarters. If a downturn begins during the 12 quarters, then middle expansion is simply the period after surpassing a pre-recession peak until the next downturn. Late expansion, finally, is the period beginning after middle expansion ends, and ending when the downturn begins. If the downturn begins before middle expansion ends, then the late expansion phase is skipped.

Why 12 quarters rather than, say, 8 or 16? In the six middle expansions since 1953, a 12-quarter choice means that two expansions (1961–63 and 1976–78) have started from levels that most observers would regard as depressed and two (1971–73 and 1976–78) have ended at levels that most observers would regard as associated with accelerating inflation (the middle expansion *averages*, however, are above the depressed levels and below the inflationary ones). A shorter or longer span is less symmetrical in this regard. In any case, however, budget calculations are not sensitive to the exact length of the middle expansion.<sup>14</sup>

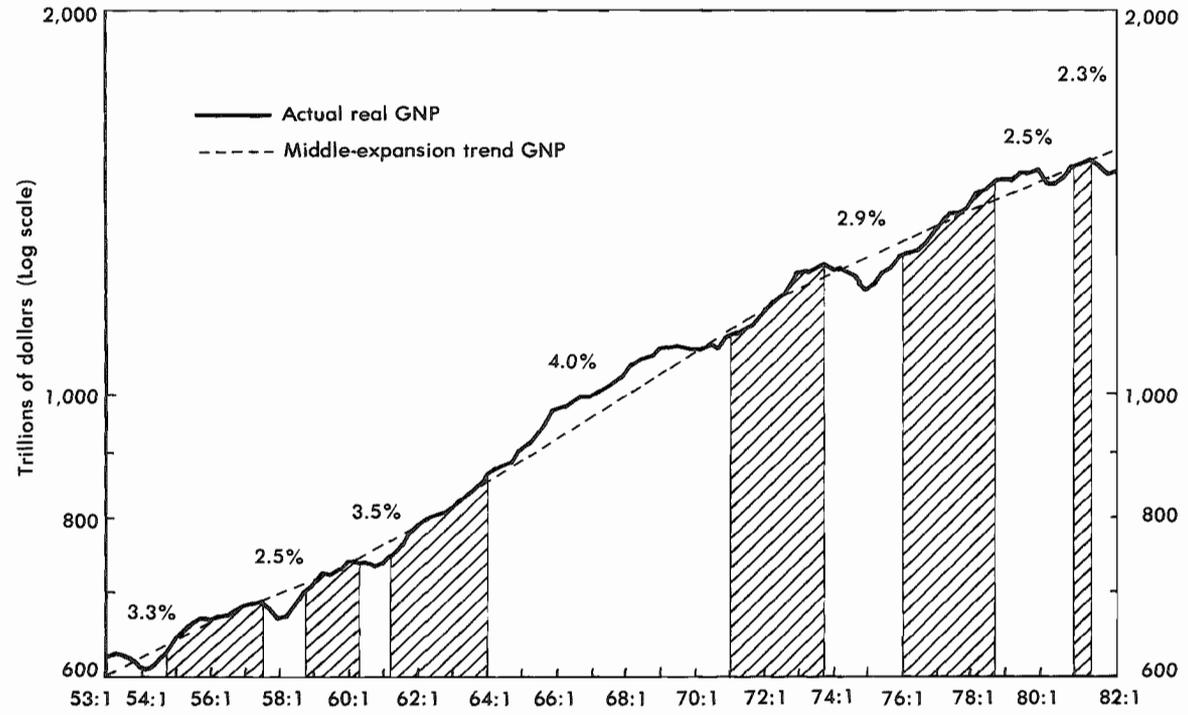
Chart 2 applies this four-phase scheme to real GNP since 1953. During the first expansion in the chart, 1954:4–1957:3, the downturn began immediately after the middle expansion period. During the next expansion, the downturn began before the end of the middle expansion period, so that in both cases the late expansion stage was skipped. During the 1961:2–1969:4 expansion, however, the middle expansion period was followed by a 5½ year late expansion. In the 1970s, the 1971:1–1973:4 middle expansion was followed directly by a downturn, but the 1976:1–1978:4 middle expansion was followed by a late expansion lasting until 1980:1. The 1981:1–1981:3 middle expansion lasted only three quarters. Finally, the trend after 1981 is based on a forecast 1983:3–1986:2 middle expansion (not shown in the chart).<sup>15</sup>

<sup>13</sup>Current cycles are demarcated on preliminary bases by the Statistical Indicators Division at BEA.

<sup>14</sup>Various measures of the cyclical timing of inflation changes suggest that 12 quarters is a reasonable judgmental delineation. Simulations using an eight quarter cutoff, however, had no appreciable effect on the results.

<sup>15</sup>The trend since 1981:3 is based on the Administration's midsession review and underlies the budget estimates shown later in this paper.

Chart 2  
Actual and Middle-expansion Trend Real GNP



At the start of a middle expansion period, the mid-expansion approach is generally easy to keep up to date. Forecasts of GNP often fall within a narrow range, so there is broad agreement on the next point to which to anchor the trend line. In contrast, when the middle of an expansion has just been passed, keeping a middle-expansion trend up to date is subject to uncertainty. Probably using two or three alternative rates of extrapolation is wise.

### C. *Estimating the Cyclically Adjusted Budget and Cyclically Adjusted Debt*

The methodology for cyclically adjusting receipts and expenditures and estimating the sources of change is described in the *Survey of Current Business*.<sup>16</sup> Exactly the same methodology applies to a budget based on a mid-expansion trend as to a budget based on potential GNP. The only difference is the substitution of the new mid-expansion GNP reference trend and an associated unemployment trend for potential GNP and the high employment unemployment rate.

The unemployment rate trend is calculated by averaging unemployment rates during each middle expansion, placing the average at the center of the middle expansion, and linearly connecting these averages.<sup>17</sup> The middle-expansion GNP and unemployment rate reference trends and gaps are show in Table 1.

Cyclical adjustment of the debt raises a few additional complications. Basically, the debt is the cumulative deficit, and cyclically adjusted debt is actual debt less the cumulative differences between the actual deficit and the cyclically adjusted deficit. However, our measure of the debt, the market value of outstanding Treasury obligations held by the public (including the Federal Reserve), differs from cumulative deficits in the national income and product accounts (NIPAs) because of a number of reconciliation items. Appendix 2 shows these items in detail.

One important source of difference is federal lending, which in the NIPAs does not constitute an expenditure but which does require additional Treasury borrowing to finance. We could consolidate loans and borrowing and get rid of this reconciliation item. However, much federal lending is for special borrowers, such as rural electrical systems or subsidized housing projects—borrowers that might well not be in the capital markets at all in the absence of federal programs. We therefore prefer to keep track of

<sup>16</sup>de Leeuw, et al., "High-Employment Budget: New Estimates," and Frank de Leeuw and Thomas M. Holloway, "The High-Employment Budget: Revised Estimates and Automatic Inflation Effects," *Survey of Current Business*, 62 (April 1982), pp. 21-33.

<sup>17</sup>The middle-expansion period is modified in calculating the unemployment rate average by omitting the first quarter of each middle expansion. The reason for the amendment is that unemployment typically lags behind output at the beginning of a middle expansion, but not at the end; unemployment is classified by the BEA Statistical Indicators Division as a lagging indicator at troughs, but a leading indicator at peaks. The unemployment averages derived in this way for the six middle expansions since 1953 are: 1955-57 (4.2%); 1959-60 (5.4%); 1961-63 (5.7%); 1971-73 (5.4%); 1976-78 (6.9%); 1981 (7.4%).

**Table 1**  
**Cyclically Adjusted<sup>1</sup> and Actual Unemployment Rate and GNP**

Year	Unemployment rate			GNP		
	Cyclically adjusted	Actual	Gap: col. (1) less col. (2)	Cyclically adjusted	Actual	Gap: col. (4) less col. (5)
			col. (3)			col. (4)
(1)	(2)	(3)	(4)	(5)	(6)	
1955	4.1	4.4	-0.3	396.0	400.0	-1.0
1956	4.3	4.1	0.1	421.0	421.7	-0.2
1957	4.6	4.3	0.3	446.2	444.0	0.5
1958	4.9	6.8	-1.9	464.9	449.7	3.3
1959	5.3	5.5	-0.2	488.2	487.9	0.1
1960	5.5	5.6	-0.1	512.6	506.5	1.2
1961	5.6	6.7	-1.1	535.4	524.6	2.0
1962	5.7	5.5	0.2	564.5	565.0	-0.1
1963	5.7	5.6	0.1	595.4	596.7	-0.2
1964	5.7	5.2	0.5	628.9	637.7	-1.4
1965	5.7	4.5	1.2	668.6	691.1	-3.4
1966	5.6	3.8	1.8	718.1	756.0	-5.3
1967	5.6	3.8	1.8	769.4	799.6	-3.9
1968	5.6	3.6	2.0	835.7	873.4	-4.5
1969	5.5	3.5	2.0	914.5	944.0	-3.3
1970	5.5	5.0	0.5	1002.3	992.7	0.9
1971	5.5	6.0	-0.5	1094.8	1077.6	1.6
1972	5.5	5.6	-0.1	1184.5	1185.9	-0.1
1973	5.7	4.9	0.8	1290.8	1326.4	-2.8
1974	6.0	5.6	0.3	1445.7	1434.2	0.7
1975	6.3	8.5	-2.2	1624.8	1549.2	4.7
1976	6.5	7.7	-1.2	1759.0	1718.0	2.3
1977	6.8	7.1	-0.2	1914.6	1918.3	-0.2
1978	7.0	6.1	0.9	2112.0	2163.9	-2.4
1979	7.1	5.8	1.3	2357.2	2417.8	-2.6
1980	7.2	7.1	0.1	2643.7	2631.7	0.4
1981	7.4	7.6	-0.2	2966.5	2954.1	0.4
1982	7.7	9.7	-2.0	3217.0	3073.0	4.5
1983 <sup>2</sup>	8.1	10.0	-1.9	3442.6	3304.0	4.0

<sup>1</sup>Based on mid-expansion trend.<sup>2</sup>Partly based on the Administration forecast of June 29, 1983.

federal lending separately rather than net it against borrowing. Other differences between Treasury obligations and the cumulative deficit are all combined into a single discrepancy item which we also keep track of separately.

We focus on Treasury obligations held by the public because they compete directly with private securities. It is important to bear in mind, however, that every component of federal net worth presumably has some economic impact, even though we have chosen to focus on the component most relevant to current concerns about the budget.

The basic identity relating the debt to its components is:

$$(1) \quad \Delta D_t = \sum_{j=1}^n E_t^j - \sum_{j=1}^m T_t^j + \Delta L_t + Z_t$$

where:

$D_t$  = cyclically adjusted market value of Treasury debt held by the public at the end of period  $t$ ;

$\Delta D_t$  = change in  $D$  during period  $t$ ;

$E_t^j$  = cyclically adjusted expenditure on category  $j$  (e.g., defense purchases, transfer payments) during period  $t$ ;

$T_t^j$  = cyclically adjusted tax receipts from category  $j$  (e.g., personal income taxes, indirect business taxes) during period  $t$ ;

$L_t$  = Government direct loans at the end of period  $t$ ;

$\Delta L_t$  = Government net lending (lending minus loan repayments) during period  $t$ ;

$Z_t$  = other factors affecting  $\Delta D_t$ .

Over any lengthy time-span it is better to examine these components as ratios to trend GNP (in current dollars) than as dollar amounts. Symbolizing trend GNP by  $Y_t^*$ , we write:

$$(2) \quad \frac{\Delta D_t}{Y_t^*} = \frac{\sum_{j=1}^n E_t^j}{Y_t^*} - \frac{\sum_{j=1}^m T_t^j}{Y_t^*} + \frac{\Delta L_t}{Y_t^*} + \frac{Z_t}{Y_t^*}$$

These ratios of expenditures, taxes, net lending, and the residual  $Z$  to trend GNP will be presented and analyzed below.

The left-hand variable in equation (2), the ratio of the cyclically adjusted deficit to GNP, is not the same as the change in the debt-to-GNP ratio. The latter, in which we are especially interested, depends not only on the deficit-to-GNP ratio, but also on the rate of growth of trend GNP.

Specifically,

$$(3) \quad \Delta \left( \frac{D_t}{Y_t^*} \right) = \left( \frac{\Delta D_t}{Y_t^*} \right) - \left( \frac{D_{t-1}}{Y_t^*} \right) \left( \frac{\Delta Y_t^*}{Y_{t-1}^*} \right)$$

For analyzing changes in the debt-to-GNP ratio, furthermore, it is instructive to treat one category of expenditures, net interest payments, separately from other expenditures. Unlike other expenditures, net interest payments are not discretionary even in the long run. Net interest payments equal the initial stock of net debt,  $(D_{t-1} - L_{t-1})$ , times an effective interest rate,  $r_t$ .<sup>18</sup> Combining this expression for net interest payments with equation (3), we can write:

$$(4) \quad \Delta \left( \frac{D_t}{Y_t^*} \right) = \frac{\Delta D_t - E_t^I}{Y_t^*} + r_t \left( \frac{D_{t-1} - L_{t-1}}{Y_t^*} \right) - \left( \frac{D_{t-1}}{Y_t^*} \right) \left( \frac{\Delta Y_t^*}{Y_{t-1}^*} \right)$$

where  $E_t^I$  is the net interest component of expenditures.

Letting  $g_t$  represent  $\Delta Y_t^*/Y_{t-1}^*$ , the growth rate of  $Y_t^*$ , and noting that  $Y_t^* = Y_{t-1}^* (1 + g_t)$ , we can rewrite (4) as:

$$(5) \quad \Delta \left( \frac{D_t}{Y_t^*} \right) = \frac{\Delta D_t - E_t^I}{Y_t^*} + \left( \frac{D_{t-1}}{Y_{t-1}^*} \right) \left( \frac{(r_t - g_t)}{(1 + g_t)} \right) - \left( \frac{L_{t-1}}{Y_{t-1}^*} \right) \left( \frac{r_t}{(1 + g_t)} \right)$$

This is the expression for the change in the ratio of debt to trend GNP that we will analyze later. The first term on the right-hand side covers all the items, except net interest, covered in the analysis of the deficit-to-GNP ratio (equation (2) above). There are two additional terms. One depends critically on the difference between the effective interest rate on the debt and the growth rate of trend GNP. The other measures interest receipts from loans outstanding.

<sup>18</sup>To a minor extent, interest payments depend on debt and loans contracted for during period  $t$ ; but the dependence is small enough to ignore.

## II. Analysis of the Cyclically Adjusted Budget and Debt

### A. *The Tables*

Measures of the cyclically adjusted budget and cyclically adjusted debt are shown in Tables 2 through 8 and Charts 3 through 5. These tables and charts are all based on middle-expansion trend GNP. Table 9 and Chart 6 compare these results with results based on a 6-percent-unemployment-rate trend GNP. We have aimed to provide enough detail in the tables so that readers can make their own comparisons and draw their own conclusions rather than simply follow our analysis.

Table 2 shows annual and quarterly estimates of cyclically adjusted receipts, expenditures, and the surplus/deficit, both in billions of dollars and as a percent of cyclically adjusted GNP. The table also divides *changes* in receipts, expenditures, and the surplus/deficit into two components — the automatic effects of inflation and the combined effects of discretionary policy changes and other factors (such as demographic trends).<sup>19</sup> On balance, as the table shows, the automatic effects of inflation push the budget toward surplus. The acceleration of inflation during the 1970s and the deceleration since 1981 have affected the magnitude of this force.

Tables 3 through 6 provide detail underlying Table 2. Tables 3 and 4 show major receipt and expenditure categories as percentages of cyclically adjusted GNP. Tables 5 and 6 divide changes in major categories of receipts and expenditures into the automatic effects of inflation and the effects of discretionary policy changes and other factors.

### B. *The Growth in the Deficit*

We will use these tables to analyze the growth in the cyclically adjusted deficit from 1981 to 1983, from 1.9 percent to 4.0 percent of trend GNP. We first show which categories of receipts and expenditures account for the growth. Then we compare the 1981–83 growth of the deficit with the much smaller 1973–81 growth and show which categories are responsible for the acceleration of growth between the two periods.

From Tables 3 and 4, it appears that four major categories more than accounted for the 2.1 percentage point rise in the deficit-to-GNP ratio from 1981 to 1983 (their percentage-point changes are in parentheses);

- increase in defense spending (0.8)
- reduction in personal taxes (0.6)
- increase in interest payments (0.6)
- reduction in corporate taxes (0.5)

Slightly offsetting these four factors were an increase in contributions for social insurance of 0.3 percentage points and a reduction in nondefense purchases of 0.3 percentage points.

<sup>19</sup>See de Leeuw and Holloway, "The High-Employment Budget: Revised Estimates and Automatic Inflation Effects."

**Table 2**  
**Cyclically Adjusted Federal Receipts and Expenditures**  
**(Billions of dollars; quarters at seasonally adjusted annual rates)**

Year and quarter	Receipts					Expenditures					Surplus or deficit (-)				
	Level	Percentage of cyclically adjusted GNP	Change from preceding period			Level	Percentage of cyclically adjusted GNP	Change from preceding period			Level	Percentage of cyclically adjusted GNP	Change from preceding period		
			Total	Due to automatic inflation effects	Due to discretionary policy and other factors			Total	Due to automatic inflation effects	Due to discretionary policy and other factors			Total	Due to automatic inflation effects	Due to discretionary policy and other factors
1955	71.6	18.1	—	—	—	68.0	17.2	—	—	—	3.6	0.9	—	—	—
1956	78.0	18.5	6.4	3.1	3.4	72.1	17.1	4.1	0	4.1	6.0	1.4	2.4	3.0	-0.6
1957	82.7	18.5	4.7	3.1	1.6	79.9	17.9	7.8	0	7.8	2.9	0.6	-3.1	3.0	-6.2
1958	83.0	17.8	0.3	0.5	-0.2	87.7	18.9	7.8	0	7.8	-4.8	-1.0	-7.7	0.5	-8.1
1959	90.1	18.5	7.1	2.2	5.0	90.8	18.6	3.1	0	3.0	-0.7	-0.1	4.1	2.2	1.9
1960	98.3	19.2	8.2	0.9	7.2	93.1	18.2	2.3	0	2.3	5.2	1.0	5.9	0.8	5.0
1961	101.3	18.9	3.0	0.4	2.7	101.1	18.9	8.0	0	8.1	0.2	0	-5.0	0.3	-5.3
1962	106.3	18.8	5.0	2.3	2.7	110.5	19.6	9.4	0	9.4	-4.3	-0.8	-4.5	2.3	-6.7
1963	114.3	19.2	8.0	1.6	6.5	114.2	19.2	3.7	0	3.7	0	0	4.3	1.6	2.8
1964	112.9	18.0	-1.4	1.8	-3.2	118.7	18.9	4.5	0.1	4.3	-5.8	-0.9	-5.8	1.7	-7.5
1965	118.8	17.8	5.9	3.0	2.9	125.0	18.7	6.3	0	6.3	-6.1	-0.9	-0.3	2.9	-3.3
1966	132.3	18.4	13.5	5.1	8.5	145.7	20.3	20.7	0.3	20.4	-13.4	-1.9	-7.3	4.7	-11.9
1967	143.2	18.6	10.9	4.3	6.7	165.9	21.6	20.2	0.5	19.7	-22.6	-2.9	-9.2	3.6	-12.9
1968	164.7	19.7	21.5	8.1	13.3	183.3	21.9	17.4	0.7	16.7	-18.6	-2.2	4.0	7.5	-3.4
1969	189.3	20.7	24.6	10.6	14.0	191.6	21.0	8.3	1.1	7.3	-2.3	-0.3	16.3	9.6	6.7
1970	196.2	19.6	6.9	11.2	-4.4	204.8	20.4	13.2	1.3	11.8	-8.6	-0.9	-6.3	9.8	-16.1
1971	204.4	18.7	8.2	10.0	-1.7	220.4	20.1	15.6	3.7	11.9	-15.9	-1.5	-7.3	6.2	-13.5
1972	228.3	19.3	23.9	8.0	15.9	244.4	20.6	24.0	4.2	19.8	-16.1	-1.4	-0.2	3.7	-3.9
1973	250.0	19.4	21.7	16.4	5.3	265.0	20.5	20.6	3.8	16.8	-15.0	-1.2	1.1	12.6	-11.4
1974	291.8	20.2	41.8	29.5	12.3	300.0	20.7	35.0	7.5	27.5	-8.1	-0.6	6.9	21.9	-15.1
1975	308.6	19.0	16.8	32.5	-15.7	351.3	21.6	51.3	11.4	40.0	-42.8	-2.6	-34.7	21.0	-55.7
1976	344.6	19.6	36.0	14.0	22.0	382.4	21.7	31.1	10.8	20.3	-37.9	-2.2	4.9	3.2	1.7
1977	375.5	19.6	30.9	23.7	7.2	421.1	22.0	38.7	12.2	26.5	-45.7	-2.4	-7.8	11.5	-19.3
1978	417.5	19.8	42.0	36.2	5.8	463.9	22.0	42.8	15.2	27.6	-46.4	-2.2	-0.7	20.9	-21.6
1979	476.7	20.2	59.2	47.8	11.4	513.8	21.8	49.9	20.8	29.1	-37.1	-1.6	9.3	27.0	-17.7
1980	544.7	20.6	68.0	54.5	13.5	603.2	22.8	89.4	28.5	60.9	-58.5	-2.2	-21.4	26.0	-47.4
1981	632.6	21.3	87.9	61.5	26.4	689.4	23.2	86.2	36.8	49.5	-56.8	-1.9	1.7	24.7	-23.0
1982	658.4	20.5	25.8	36.9	-11.1	758.4	23.6	69.0	29.5	39.5	-100.0	-3.1	-43.2	7.4	-50.6
1983 <sup>1</sup>	694.2	20.2	35.8	30.1	5.6	832.9	24.2	74.5	14.7	59.8	-138.7	-4.0	-38.7	15.4	-54.2

**Table 2 (Continued)**  
**Cyclically Adjusted Federal Receipts and Expenditures**  
**(Billions of dollars; quarters at seasonally adjusted annual rates)**

Year and quarter	Receipts					Expenditures					Surplus or deficit (-)				
	Level	Change from preceding period				Level	Change from preceding period				Level	Change from preceding period			
		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors
1955:I	69.7	18.0	—	—	—	67.5	17.4	—	—	—	2.2	0.6	—	—	—
II	70.7	18.0	1.0	0.7	0.3	66.5	16.9	-1.0	0	-1.0	4.2	1.1	2.0	0.7	1.3
III	72.0	18.1	1.3	0.6	0.7	68.9	17.3	2.4	0	2.4	3.1	0.8	-1.1	0.6	-1.7
IV	73.8	18.3	1.8	0.5	1.3	68.9	17.0	0	0	0	4.9	1.2	1.8	0.5	1.3
1956:I	75.8	18.4	2.0	0.8	1.2	69.5	16.9	0.6	0	0.6	6.3	1.5	1.4	0.7	0.7
II	77.6	18.6	1.8	0.8	1.0	71.8	17.2	2.3	0	2.3	5.8	1.4	-0.5	0.8	-1.3
III	78.2	18.4	0.6	1.3	-0.7	72.5	17.1	0.7	0	0.7	5.8	1.4	0	1.2	-1.2
IV	80.5	18.7	2.3	0.9	1.4	74.4	17.3	1.9	0	1.9	6.1	1.4	0.3	0.9	-0.6
1957:I	82.4	18.8	1.9	1.2	0.7	78.4	17.9	4.0	0	4.0	4.0	0.9	-2.1	1.2	-3.3
II	82.9	18.7	0.5	0	0.5	80.1	18.1	1.7	0	1.7	2.8	0.6	-1.2	0	-1.2
III	83.0	18.4	0.1	0.9	-0.8	80.1	17.8	0	0	0	2.9	0.6	0.1	0.9	-0.8
IV	82.5	18.2	-0.5	-0.4	-0.1	80.9	17.8	0.8	0	0.8	1.7	0.4	-1.2	-0.4	-0.8
1958:I	82.2	17.9	-0.3	0.1	-0.4	82.6	18.0	1.7	0	1.7	-0.4	-0.1	-2.1	0.1	-2.2
II	81.9	17.7	-0.3	-0.2	-0.1	86.2	18.7	3.6	0	3.6	-4.3	-0.9	-3.9	-0.2	-3.7
III	83.3	17.8	1.4	0.6	0.8	90.0	19.3	3.8	0	3.8	-6.7	-1.4	-2.4	0.6	-3.0
IV	84.4	17.9	1.1	0.3	0.8	92.0	19.5	2.0	0	2.0	-7.6	-1.6	-0.9	0.3	-1.2
1959:I	88.2	18.4	3.8	1.0	2.8	89.9	18.8	-2.1	0	-2.1	-1.7	-0.4	5.9	1.0	4.9
II	90.4	18.6	2.2	0.8	1.4	89.9	18.5	0	0	0	0.5	0.1	2.2	0.8	1.4
III	90.6	18.5	0.2	0.2	0	91.5	18.6	1.6	0	1.6	-0.9	-0.2	-1.4	0.2	-1.6
IV	91.1	18.3	0.5	-0.1	0.6	91.7	18.5	0.2	0	0.2	-0.6	-0.1	0.3	-0.1	0.4
1960:I	97.4	19.3	6.3	0.6	5.7	90.4	17.9	-1.3	0	-1.3	7.0	1.4	7.6	0.5	7.1
II	97.7	19.2	0.3	-0.1	0.4	92.5	18.2	2.1	0	2.1	5.2	1.0	-1.8	-0.1	-1.7
III	98.3	19.1	0.6	0.4	0.2	94.1	18.2	1.6	0	1.6	4.2	0.8	-1.0	0.4	-1.4
IV	99.6	19.1	1.3	-0.1	1.4	95.2	18.3	1.1	0	1.1	4.4	0.8	0.2	-0.1	0.3

1961:I	99.6	19.0	0	-0.5	0.5	98.0	18.7	2.8	0	2.8	1.6	0.3	-2.8	-0.5	-2.3
II	100.5	18.9	0.9	0.5	0.4	100.6	18.9	2.6	0	2.6	-0.1	0	-1.7	0.5	-2.2
III	102.2	18.9	1.7	0.7	1.0	101.9	18.9	1.3	0	1.3	0.3	0.1	0.4	0.6	-0.2
IV	102.9	18.9	0.7	0.1	0.6	103.9	19.1	2.0	0	2.0	-1.0	-0.2	-1.3	0.1	-1.4
1962:I	103.4	18.7	0.5	1.2	-0.7	108.9	19.6	5.0	0	5.0	-5.5	-1.0	-4.5	1.2	-5.7
II	104.8	18.7	1.4	0.4	1.0	109.3	19.5	0.4	0	0.4	-0.8	-0.6	1.0	0.4	0.6
III	107.2	18.9	2.4	0.1	2.3	110.8	19.5	1.5	0	1.5	-3.6	-0.8	0.9	0.1	0.8
IV	109.6	19.0	2.4	0.8	1.6	113.0	19.6	2.2	0	2.2	-3.4	-0.6	0.2	0.8	-0.6
1963:I	112.6	19.3	3.0	0.6	2.4	113.5	19.4	0.5	0	0.5	-0.9	-0.2	2.5	0.6	1.9
II	114.4	19.4	1.8	-0.2	2.0	112.2	19.0	-1.3	0	-1.3	2.1	0.4	3.0	-0.2	3.2
III	114.5	19.1	0.1	-0.1	-0.1	114.3	19.1	2.1	0	2.1	0.2	0	-1.9	0.2	-2.1
IV	115.7	19.0	1.2	1.1	0.1	116.9	19.2	2.6	0.1	2.5	-1.2	-0.2	-1.4	1.0	-2.4
1964:I	113.1	18.4	-2.6	0.3	-2.9	118.5	19.2	1.6	0	1.6	-5.4	-0.9	-4.2	0.3	-4.5
II	109.8	17.6	-3.3	0.3	-3.6	119.2	19.1	0.7	0	0.7	-9.4	-1.5	-4.0	0.3	-4.3
III	113.2	17.9	3.4	0.7	2.7	118.2	18.7	-1.0	0	-1.0	-5.1	-0.8	4.3	0.7	3.6
IV	115.5	18.0	2.3	0.2	2.1	118.7	18.5	0.5	0	0.5	-3.1	-0.5	2.0	0.2	1.8
1965:I	118.9	18.2	3.4	1.3	2.1	119.0	18.2	0.3	0	0.3	0	0	3.1	1.3	1.8
II	119.8	18.1	0.9	0.7	0.2	121.4	18.3	2.4	0	2.4	-1.6	-0.2	-1.6	0.7	-2.3
III	117.6	17.5	-2.2	0.9	-3.1	127.4	18.9	6.0	0	6.0	-9.8	-1.5	-8.2	0.8	-9.0
IV	118.9	17.4	1.3	0.6	0.7	132.1	19.3	4.7	0.1	4.6	-13.1	-1.9	-3.3	0.5	-3.8
1966:I	126.2	18.1	7.3	1.7	5.6	137.6	19.7	5.4	0.1	5.4	-11.5	-1.6	1.6	1.5	0.1
II	131.9	18.5	5.7	2.0	3.7	142.0	19.9	4.4	0	4.4	-10.1	-1.4	1.4	2.0	-0.6
III	134.5	18.6	2.6	0.8	1.8	149.0	20.6	7.0	0.1	6.9	-14.5	-2.0	-4.4	0.8	-5.2
IV	136.7	18.5	2.2	1.6	0.6	154.0	20.9	5.0	0.1	4.9	-17.3	-2.3	-2.8	1.4	-4.2
1967:I	139.6	18.6	2.9	0.8	2.1	162.0	21.6	8.0	0.2	7.8	-22.4	-3.0	-5.1	0.5	-5.6
II	140.9	18.5	1.3	0.2	1.1	163.1	21.4	1.1	0.1	1.0	-22.1	-2.9	0.3	0.1	0.2
III	144.2	18.6	3.3	1.4	1.9	167.3	21.6	4.2	0.1	4.1	-23.1	-3.0	-1.0	1.3	-2.3
IV	148.2	18.7	4.0	2.0	2.0	171.1	21.6	3.8	0.1	3.7	-22.8	-2.9	-1.0	1.9	-1.6
1968:I	155.8	19.2	7.6	2.6	5.0	175.8	21.7	4.7	0.2	4.5	-20.1	-2.5	2.7	2.4	0.3
II	156.7	19.2	2.9	2.5	0.4	183.6	22.2	7.8	0.3	7.5	-24.9	-3.0	-4.8	2.2	-7.0
III	165.7	20.0	10.0	1.4	8.6	185.4	22.0	1.8	0.2	1.6	-16.7	-2.0	8.2	1.3	6.9
IV	175.5	20.3	6.8	2.8	4.0	188.2	21.8	2.8	0.2	2.6	-12.6	-1.5	4.1	2.6	1.5
1969:I	184.5	20.9	9.0	2.3	6.7	187.2	21.2	-1.0	0.3	-1.3	-2.6	-0.3	10.0	2.0	8.0
II	189.1	21.0	4.6	3.0	1.6	190.3	21.1	3.1	0.4	2.7	-1.2	-0.1	1.4	2.6	-1.2
III	189.0	20.4	-0.1	3.8	-3.9	192.9	20.8	2.6	0.2	2.4	-3.8	-0.4	-2.6	3.6	-6.2
IV	194.5	20.5	5.5	3.0	2.5	196.1	20.7	3.2	0.2	3.0	-1.6	-0.2	2.2	2.7	-0.5
1970:I	193.8	20.0	-0.7	3.1	-3.8	194.8	20.1	-1.3	0.4	-1.7	-0.9	-0.1	0.7	2.7	-2.0
II	197.9	19.9	4.1	2.7	1.4	208.1	21.0	13.3	0.4	12.9	-10.2	-1.0	-9.3	2.3	-11.6
III	194.3	19.2	-3.6	1.1	-4.7	206.1	20.4	-2.0	0.5	-2.5	-11.8	-1.2	-1.6	0.6	-2.2
IV	198.6	19.2	4.3	2.6	1.7	210.0	20.3	3.9	0.1	3.8	-11.4	-1.1	0.4	2.4	-2.0

**Table 2 (Continued)**  
**Cyclically Adjusted Federal Receipts and Expenditures**  
**(Billions of dollars; quarters at seasonally adjusted annual rates)**

Year and quarter	Receipts					Expenditures					Surplus or deficit (-)				
	Level	Change from preceding period				Level	Change from preceding period				Level	Change from preceding period			
		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors		Percentage of cyclically adjusted GNP	Total	Due to automatic inflation effects	Due to discretionary policy and other factors
1971:I	199.3	18.8	0.7	3.4	-2.7	213.2	20.1	3.2	2.6	0.6	-13.8	-1.3	-2.4	0.8	-3.2
II	203.0	18.7	3.7	3.2	0.5	220.5	20.3	7.3	0.3	7.0	-17.5	-1.6	-3.7	2.9	-6.6
III	204.9	18.5	1.9	1.3	0.6	222.0	20.1	1.5	0.5	1.0	-17.0	-1.5	0.5	0.8	-0.3
IV	210.5	18.7	5.6	1.4	4.2	225.7	20.0	3.7	0.9	2.8	-15.2	-1.3	1.8	0.5	1.3
1972:I	227.4	19.7	16.9	3.0	13.9	235.7	20.4	10.0	2.4	7.6	-8.4	-0.7	6.8	0.5	6.3
II	225.9	19.3	-1.5	1.2	-2.7	244.0	20.8	8.3	0.1	8.2	-18.1	-1.5	-9.7	1.1	-10.8
III	228.0	19.1	2.1	1.6	0.5	238.0	19.9	-6.0	0.3	-6.3	-10.1	-0.8	8.0	1.3	6.7
IV	232.0	19.1	4.0	3.3	0.7	259.7	21.3	21.7	2.4	19.3	-27.7	-2.3	-17.6	0.9	-18.5
1973:I	242.0	19.5	10.0	4.2	5.8	261.4	21.0	1.7	0.4	1.3	-19.3	-1.6	8.4	3.8	4.6
II	247.5	19.4	5.5	5.5	0	263.2	20.7	1.8	0.1	1.7	-15.7	-1.2	3.6	5.4	-1.8
III	251.8	19.3	4.3	5.5	-1.2	263.0	20.2	-0.2	1.3	-1.5	-11.2	-0.9	4.5	4.2	0.3
IV	258.6	19.3	6.8	7.0	-0.2	272.2	20.3	9.2	2.9	6.3	-13.6	-1.0	-2.4	4.1	-6.5
1974:I	272.3	19.8	13.7	5.8	7.9	280.3	20.4	8.1	1.9	6.2	-8.0	-0.6	5.6	3.9	1.7
II	284.4	20.0	12.1	8.8	3.3	296.4	20.9	16.1	1.1	15.0	-12.0	-0.8	-4.0	7.6	-11.6
III	301.7	20.6	17.3	9.7	7.6	306.0	20.9	9.6	1.9	7.7	-4.3	-0.3	7.7	7.7	0
IV	308.8	20.3	7.1	11.4	-4.3	317.1	20.9	11.1	3.8	7.3	-8.2	-0.5	-3.9	7.6	-11.5
1975:I	314.0	20.0	5.2	10.3	-5.1	328.4	20.9	11.3	2.2	9.1	-14.4	-0.9	-6.2	8.1	-14.3
II	276.2	17.2	-37.8	3.8	-41.6	347.4	21.7	19.0	1.4	17.6	-71.1	-4.4	-56.7	2.4	-59.1
III	317.5	19.3	41.3	4.5	36.8	360.2	21.9	12.8	6.8	6.0	-42.7	-2.6	28.4	-2.3	30.7
IV	326.5	19.4	9.0	5.9	3.1	369.3	21.9	9.1	2.7	6.4	-42.9	-2.5	-0.2	3.2	-3.4
1976:I	332.6	19.4	6.1	1.7	4.4	373.4	21.8	4.1	0.9	3.2	-40.9	-2.4	2.0	0.8	1.2
II	340.2	19.6	7.6	1.6	6.0	373.6	21.5	0.2	0.7	-0.5	-33.4	-1.9	7.5	0.9	6.6
III	349.3	19.7	9.1	3.8	5.3	385.0	21.7	11.4	6.0	5.4	-35.7	-2.0	-2.3	-2.2	-0.1
IV	356.2	19.6	6.9	6.5	0.4	397.7	21.9	12.7	2.5	10.2	-41.5	-2.3	-5.8	4.0	-9.8

1977:I	370.0	20.0	13.8	5.7	8.1	400.4	21.6	2.7	0.8	1.9	-30.5	-1.6	11.0	4.9	6.1
II	371.6	19.6	1.6	7.7	-6.1	412.2	21.8	11.8	2.2	9.6	-40.6	-2.1	-10.1	5.5	-15.6
III	373.5	19.3	1.9	6.5	-4.6	430.0	22.2	17.8	6.9	10.9	-56.5	-2.9	-15.9	-0.5	-15.4
IV	386.7	19.5	13.2	7.1	6.1	441.8	22.3	11.8	4.8	7.0	-55.1	-2.8	1.4	2.3	-0.9
1978:I	393.4	19.5	6.7	5.6	1.1	447.8	22.2	6.0	1.3	4.7	-54.4	-2.7	0.7	4.3	-3.6
II	409.7	19.7	16.3	14.3	2.0	454.2	21.8	6.4	1.4	5.0	-44.5	-2.1	9.9	12.9	-3.0
III	425.8	19.9	16.1	12.1	4.0	468.3	21.9	14.1	7.9	6.2	-42.5	-2.0	2.0	4.2	-2.2
IV	441.2	20.0	15.4	13.4	2.0	485.4	22.0	17.1	5.4	11.7	-44.2	-2.0	-1.7	8.0	-9.7
1979:I	458.2	20.2	17.0	11.4	5.6	491.1	21.7	5.7	2.6	3.1	-32.8	-1.4	11.4	8.8	2.6
II	472.1	20.3	13.9	11.7	2.2	497.6	21.4	6.5	2.9	3.6	-25.5	-1.1	7.3	8.8	-1.5
III	481.7	20.2	9.6	11.0	-1.4	522.4	21.9	24.8	12.0	12.8	-40.7	-1.7	-15.2	-1.0	-14.2
IV	494.7	20.2	13.0	9.8	3.2	544.1	22.2	21.7	6.6	15.1	-49.4	-2.0	-6.7	3.2	-11.9
1980:I	512.2	20.3	17.5	13.9	3.6	568.2	22.5	24.1	2.3	21.8	-56.0	-2.2	-6.6	11.6	-18.2
II	530.6	20.4	18.4	17.2	1.2	587.9	22.6	19.7	3.0	16.7	-57.3	-2.2	-1.3	14.2	-15.5
III	554.5	20.7	23.9	14.3	9.6	615.7	23.0	27.8	19.2	8.6	-61.1	-2.3	-3.8	-4.9	1.1
IV	581.5	21.0	27.0	19.0	8.0	640.9	23.1	25.2	10.5	14.7	-59.4	-2.1	1.7	8.5	-6.8
1981:I	617.5	21.6	36.0	18.1	17.9	661.9	23.2	21.0	4.6	16.4	-44.3	-1.5	15.1	13.5	1.6
II	627.2	21.5	9.7	8.3	1.4	670.7	23.0	8.8	3.5	5.3	-43.5	-1.5	0.8	4.8	-4.0
III	640.6	21.3	13.4	15.1	-1.7	702.2	23.4	31.5	18.1	13.4	-61.6	-2.1	-18.1	-3.0	-15.1
IV	645.2	20.9	4.6	15.6	-11.0	722.9	23.4	20.7	9.2	11.5	-77.6	-2.5	-16.0	6.4	-22.4
1982:I	651.9	20.8	6.7	5.8	0.9	724.6	23.1	1.7	2.1	-0.4	-72.7	-2.3	4.9	3.7	1.2
II	658.4	20.6	6.5	8.3	-1.8	730.5	22.9	5.9	3.2	2.7	-72.1	-2.3	0.6	5.1	-4.5
III	658.7	20.3	0.3	4.7	-4.4	766.8	23.6	36.3	14.1	22.2	-108.1	-3.3	-36.0	-9.4	-26.6
IV	664.6	20.2	5.9	4.8	1.1	811.5	24.6	44.7	4.3	40.4	-146.9	-4.5	-38.8	0.5	-39.3
1983:I	678.3	20.2	13.7	9.2	4.5	800.1	23.8	-11.4	0.5	-11.9	-121.8	-3.6	25.1	8.7	16.4
II	693.6	20.3	15.3	8.3	7.0	811.6	23.8	11.5	2.7	8.8	-118.0	-3.5	3.8	5.6	-1.8
III <sup>1</sup>	692.9	20.0	-0.7	9.2	-9.9	863.6	24.9	52.0	1.2	50.8	-170.8	-4.9	-52.8	8.0	-60.8
IV <sup>1</sup>	711.9	20.2	19.0	8.4	10.6	856.1	24.2	-7.5	2.1	-9.6	-144.2	-4.1	26.6	6.3	20.3

<sup>1</sup>Data for the third and fourth quarters of 1983 are based on the Administration forecast of June 29, 1983.

**Table 3**  
**Cyclically Adjusted Federal Receipts, Percent of Trend GNP**

Calendar year	Total receipts	Personal taxes	Corporate profits taxes	Contributions for social insurance	Indirect business taxes
1955	18.1	7.8	5.3	2.4	2.7
1956	18.5	8.2	5.1	2.5	2.7
1957	18.5	8.4	4.8	2.7	2.7
1958	17.8	8.2	4.3	2.7	2.5
1959	18.5	8.2	4.6	3.1	2.6
1960	19.2	8.6	4.5	3.4	2.7
1961	18.9	8.6	4.3	3.4	2.6
1962	18.8	8.6	4.0	3.6	2.6
1963	19.2	8.6	4.2	3.9	2.6
1964	18.0	7.5	4.1	3.8	2.5
1965	17.8	7.7	4.1	3.7	2.4
1966	18.4	7.9	4.0	4.4	2.1
1967	18.6	8.2	3.8	4.6	2.0
1968	19.7	8.9	4.1	4.7	2.1
1969	20.7	9.8	3.9	5.0	2.0
1970	19.6	9.3	3.5	4.9	1.9
1971	18.7	8.4	3.3	5.0	1.9
1972	19.3	9.2	3.1	5.3	1.7
1973	19.4	8.5	3.2	6.0	1.6
1974	20.2	9.1	3.4	6.2	1.5
1975	19.0	8.3	3.2	6.0	1.5
1976	19.6	8.7	3.3	6.2	1.4
1977	19.6	8.9	3.2	6.2	1.3
1978	19.8	8.9	3.2	6.4	1.3
1979	20.2	9.3	3.1	6.6	1.2
1980	20.6	9.7	2.9	6.5	1.5
1981	21.3	10.1	2.4	6.9	1.9
1982	20.5	10.1	1.8	7.0	1.5
1983 <sup>1</sup>	20.2	9.5	1.9	7.2	1.6

<sup>1</sup>Partly based on the Administration forecast of June 29, 1983.

**Table 4**  
**Cyclically Adjusted Federal Expenditures, Percent of Trend GNP**

Calendar year	Total expenditures	Defense purchases	Nondefense purchases	Transfer payments	Net interest	All other <sup>1</sup>
1955	17.2	9.7	1.5	3.6	1.2	1.2
1956	17.1	9.5	1.4	3.6	1.2	1.4
1957	17.9	9.9	1.3	4.0	1.2	1.5
1958	18.9	9.8	1.8	4.3	1.1	1.8
1959	18.6	9.3	1.7	4.5	1.3	1.8
1960	18.2	8.7	1.8	4.6	1.3	1.8
1961	18.9	8.8	1.9	4.9	1.2	2.1
1962	19.6	9.0	2.2	4.9	1.2	2.1
1963	19.2	8.4	2.4	4.9	1.2	2.2
1964	18.9	7.8	2.6	4.9	1.3	2.4
1965	18.7	7.4	2.7	5.0	1.3	2.3
1966	20.3	8.4	2.6	5.3	1.3	2.8
1967	21.6	9.3	2.5	5.8	1.3	2.7
1968	21.9	9.2	2.5	6.1	1.4	2.8
1969	21.0	8.3	2.3	6.1	1.4	2.8
1970	20.4	7.3	2.2	6.4	1.3	3.1
1971	20.1	6.4	2.4	6.8	1.3	3.2
1972	20.6	6.2	2.4	7.0	1.3	3.8
1973	20.5	5.6	2.3	7.6	1.3	3.7
1974	20.7	5.3	2.3	8.2	1.4	3.5
1975	21.6	5.1	2.4	8.7	1.6	3.8
1976	21.7	4.9	2.5	8.9	1.7	3.8
1977	22.0	4.8	2.6	9.0	1.6	3.9
1978	22.0	4.7	2.5	8.9	1.6	4.1
1979	21.8	4.7	2.4	9.1	1.7	3.8
1980	22.8	5.0	2.5	9.5	2.0	3.8
1981	23.2	5.2	2.5	9.6	2.5	3.4
1982	23.6	5.6	2.5	9.7	2.8	3.1
1983 <sup>2</sup>	24.2	6.0	2.2	9.7	3.1	3.3

<sup>1</sup>Consists of grants-in-aid, subsidies less current surplus of government enterprises, and wage accruals less disbursements.

<sup>2</sup>Partly based on the Administration forecast of June 29, 1983.

**Table 5**  
**Sources of Change in Cyclically Adjusted Federal Receipts**

	Total change					Change due to automatic inflation effects					Change due to discretionary policy and other factors				
	Total receipts	Personal taxes	Corporate profits taxes	Contributions for social insurance	Indirect business taxes	Total receipts	Personal taxes	Corporate profits taxes	Contributions for social insurance	Indirect business taxes	Total receipts	Personal taxes	Corporate profits taxes	Contributions for social insurance	Indirect business taxes
1956	6.4	3.7	0.9	1.2	0.7	3.1	1.6	1.2	0.1	0.2	3.4	2.2	-0.3	1.1	0.6
1957	4.7	2.7	-0.3	1.8	0.6	3.1	1.9	0.6	0.2	0.3	1.6	0.7	-1.1	1.5	0.3
1958	0.3	1.0	-1.2	0.3	0	0.5	1.1	-0.8	0.1	0	-0.2	-0.1	-0.4	0.3	0
1959	7.1	1.6	2.5	2.4	0.6	2.2	1.3	0.6	0.1	0.1	5.0	0.3	1.9	2.3	0.6
1960	8.2	4.0	0.4	2.6	1.1	0.9	1.0	-0.4	0	0	7.2	3.0	0.8	2.6	1.1
1961	3.0	1.9	0	0.9	0.3	0.4	0.7	-0.4	0	0	2.7	1.2	0.5	0.8	0.3
1962	5.0	2.7	-0.3	2.0	0.7	2.3	1.3	0.8	0.1	0.1	2.7	1.4	-1.2	1.9	0.6
1963	8.0	2.6	2.3	2.5	0.6	1.6	1.3	0.2	0.1	0.1	6.5	1.3	2.2	2.4	0.6
1964	-1.4	-3.7	0.8	0.7	0.8	1.8	1.1	0.3	0.1	0.1	-3.2	-4.8	0.5	0.6	0.7
1965	5.9	3.9	1.3	0.8	0	3.0	1.7	0.9	0.3	0.1	2.9	2.2	0.4	0.5	-0.1
1966	13.5	5.4	1.8	7.3	-1.1	5.1	2.6	1.9	0.5	0.2	8.5	2.8	-0.2	6.9	-1.3
1967	10.9	6.3	0.1	3.7	0.8	4.3	2.8	0.8	0.6	0.2	6.7	3.5	-0.6	3.1	0.7
1968	21.5	11.1	4.9	3.8	1.6	8.1	4.3	2.7	0.9	0.4	13.3	6.9	2.2	2.9	1.2
1969	24.6	15.6	1.9	6.0	1.1	10.6	6.1	2.8	1.2	0.4	14.0	9.5	-0.9	4.8	0.7
1970	6.9	3.1	-1.1	3.9	1.0	11.2	7.1	2.3	1.2	0.4	-4.4	-4.0	-3.4	2.7	0.6
1971	8.2	-0.4	1.8	5.7	1.2	10.0	6.8	1.4	1.2	0.4	-1.7	-7.3	0.4	4.5	0.8
1972	23.9	16.2	0.4	7.9	-0.7	8.0	6.3	0.1	1.2	0.4	15.9	10.0	0.3	6.7	-1.1
1973	21.7	1.7	4.1	14.9	0.9	16.4	9.1	4.7	2.1	0.4	5.3	-7.4	-0.6	12.8	0.4
1974	41.8	20.8	8.5	11.6	1.0	29.5	15.2	9.2	4.2	0.7	12.3	5.6	-0.7	7.4	0.3
1975	16.8	3.4	2.0	8.4	3.0	32.5	19.3	5.8	6.5	0.8	-15.7	-15.9	-3.8	1.8	2.2
1976	36.0	19.2	6.2	11.6	-1.0	14.0	12.5	-3.9	4.9	0.6	22.0	6.8	10.1	6.8	-1.6
1977	30.9	16.9	3.3	9.5	1.2	23.7	15.2	2.3	5.5	0.6	7.2	1.6	1.0	4.0	0.7
1978	42.0	17.4	6.6	15.4	2.7	36.2	21.0	6.8	7.7	0.8	5.8	-3.6	-0.2	7.7	1.8
1979	59.2	32.1	4.9	21.0	1.1	47.8	28.1	9.4	9.3	1.2	11.4	4.0	-4.5	11.7	0
1980	68.0	36.6	3.3	17.8	10.3	54.5	34.0	9.1	10.4	1.1	13.5	2.6	-5.8	7.4	9.2
1981	87.9	44.3	-5.9	32.2	17.4	61.5	40.4	7.5	12.2	1.3	26.4	3.9	-13.4	20.0	16.2
1982	25.8	24.1	-12.4	21.0	-6.9	36.9	29.9	-5.0	11.0	1.1	-11.1	-5.7	-7.5	9.9	-8.0
1983	35.8	0.6	7.9	22.1	5.2	30.1	23.2	-3.8	9.8	0.8	5.6	-22.6	11.7	12.2	4.4

**Table 6**  
**Sources of Change in Cyclically Adjusted Federal Expenditures**

	Total change				Change due to automatic inflation effects				Change due to discretionary policy and other factors					
	Total		Net		Total		Net		Total		Net			
	Defense expenditures	Nondefense purchases	Transfer payments	Other <sup>1</sup> interest	Defense expenditures	Nondefense purchases	Transfer payments	Other <sup>1</sup> interest	Defense expenditures	Nondefense purchases	Transfer payments	Other <sup>1</sup> interest		
1956	4.1	1.8	-0.3	1.1	0	0	0	0	4.1	1.7	-0.3	1.1	0.5	1.1
1957	7.8	3.8	0.2	0.5	0	0	0	0	7.8	3.9	0.2	1.1	0.5	0.9
1958	7.8	1.6	2.4	-0.4	0	0	0	0	7.8	1.5	2.4	2.4	-0.4	1.9
1959	3.1	0	0	1.7	0	0	0	0	3.0	0	-0.1	1.7	1.0	0.5
1960	2.3	-1.1	1.0	1.6	0	0	0	0	2.3	-1.1	1.0	1.6	0.6	0.2
1961	8.0	2.5	1.1	2.8	0	0	0	0	8.1	2.5	1.1	2.8	-0.5	2.1
1962	9.4	4.1	2.3	1.6	0	0	0	0	9.4	4.1	2.3	1.6	0.5	0.9
1963	3.7	-0.8	1.6	1.5	0	0	0	0	3.7	-0.8	1.6	1.4	0.6	0.8
1964	4.5	-1.3	1.9	1.2	0	0	0	0	4.3	-1.3	1.8	1.1	0.7	2.0
1965	6.3	0.4	1.6	3.1	0	0	0	0	6.3	0.4	1.7	3.0	0.4	0.8
1966	20.7	10.9	0.7	4.1	0	0	0	0	20.4	10.8	0.7	3.9	0.8	4.2
1967	20.2	11.2	1.0	6.7	0	0	0	0	19.7	11.1	1.0	6.2	0.7	0.7
1968	17.4	5.4	1.7	6.3	0	0	0	0	16.7	5.4	1.7	5.7	1.4	2.4
1969	8.3	-0.6	0	4.9	1.1	0	0	0	7.3	-0.5	0.1	3.9	1.4	2.5
1970	13.2	-2.7	1.0	9.0	1.3	0	0	0	11.8	-2.7	0.9	8.0	0.6	5.0
1971	15.6	-3.4	3.8	9.8	1.1	1.9	0.6	1.1	11.9	-5.2	3.2	6.7	1.2	4.0
1972	24.0	2.9	2.5	8.4	4.2	2.9	0.5	0.9	19.8	0.1	2.1	7.5	0.8	9.4
1973	20.6	-0.3	0.6	14.8	3.8	1.5	0.4	1.3	16.8	-1.9	0.2	13.5	1.6	3.3
1974	35.0	4.2	4.8	21.3	3.0	1.7	7.5	0.4	27.5	2.7	4.4	17.6	1.5	1.3
1975	51.3	6.0	5.8	22.8	5.7	11.0	11.4	0.4	40.0	4.1	5.4	15.7	4.4	10.4
1976	31.1	3.0	3.5	15.3	4.1	5.2	10.8	0.7	20.3	1.3	2.8	6.5	5.3	4.4
1977	38.7	6.8	7.4	14.5	9.1	12.2	1.7	0.9	26.5	5.1	6.5	5.8	8.3	4.4
1978	42.8	7.5	2.7	17.4	4.0	11.3	15.2	1.0	27.6	5.2	1.8	7.1	2.9	10.6
1979	49.9	11.5	3.2	25.6	6.0	3.4	20.8	3.2	29.1	14.7	1.1	11.0	4.1	2.4
1980	89.4	19.4	9.4	37.7	12.7	10.2	28.5	1.4	60.9	16.2	8.0	15.2	12.7	8.8
1981	86.2	22.8	9.3	33.4	21.0	-0.3	36.8	5.0	49.5	17.8	7.7	7.0	18.7	-1.8
1982	69.0	25.4	4.1	25.0	15.3	-0.9	29.5	4.4	39.5	21.0	2.8	2.0	16.4	-2.7
1983 <sup>2</sup>	74.5	26.9	-3.3	21.8	15.8	13.3	14.7	1.8	59.8	25.1	-3.8	8.4	18.0	11.9

<sup>1</sup>Consists of grants-in-aid, subsidies less current surplus of government enterprises, and wage accruals less disbursements.  
<sup>2</sup>Party based on the Administration forecast of June 29, 1983.

**Table 7**  
**Relationship of the Cyclically Adjusted Surplus/Deficit to Changes in**  
**Cyclically Adjusted Market Debt, Percent of Trend GNP**

	Surplus(-) or deficit(+)	Plus: change in loans	Plus: debt-deficit discrepancy	Equals: change in debt
1956	-1.4	0.3	-0.9	-2.0
1957	-0.6	0.3	0.5	0.1
1958	1.0	0.7	-2.0	-0.3
1959	0.1	0.7	-0.5	0.3
1960	-1.0	0.2	1.7	0.9
1961	0	0.6	-0.6	0
1962	0.8	0.5	0.6	1.9
1963	0	0.3	-0.1	0.1
1964	0.9	0.3	0.1	1.4
1965	0.9	0.3	-0.1	1.1
1966	1.9	0.4	-0.4	1.8
1967	2.9	1.4	-1.3	2.9
1968	2.2	-0.1	-0.1	2.0
1969	0.3	-0.5	0.1	-0.2
1970	0.9	0.5	0.6	2.0
1971	1.5	0.2	0.7	2.4
1972	1.4	0.2	-0.5	1.0
1973	1.2	0.1	-0.3	1.0
1974	0.6	0.6	-0.7	0.5
1975	2.6	0.8	0.5	4.0
1976	2.2	0.7	0.9	3.7
1977	2.4	0.7	-0.8	2.3
1978	2.2	1.0	-0.7	2.4
1979	1.6	0.9	-0.7	1.7
1980	2.2	0.9	-0.9	2.2
1981	1.9	0.7	0.3	2.9
1982	3.1	0.8	1.9	5.8
1983	4.0	0.3	-0.7	3.6

**Table 8**  
**Sources of Change in the Ratio of Cyclically Adjusted Debt to Trend GNP (Percentages)**

	"Budget decisions" factor	Minus: loan interest factor	Plus: interest-rate- less-growth rate factor	Equals: change in debt/GNP ratio	Debt/GNP ratio	Trend GNP growth rate (current dollars)	Interest rate (nominal)
1956	-3.2	0.1	-2.1	-5.4	52.3	6.3	2.4
1957	-1.2	0.1	-1.6	-2.9	49.4	6.0	2.7
1958	-1.4	0.1	-0.8	-2.3	47.1	4.2	2.6
1959	-1.0	0.2	-0.8	-1.9	45.2	5.0	3.2
1960	-0.4	0.2	-0.6	-1.2	44.0	5.0	3.5
1961	-1.2	0.2	-0.5	-1.9	42.1	4.4	3.1
1962	0.7	0.2	-0.8	-0.3	41.8	5.4	3.5
1963	-1.1	0.2	-0.7	-2.0	39.8	5.5	3.6
1964	0.1	0.2	-0.6	-0.7	39.1	5.6	4.0
1965	-0.1	0.2	-0.8	-1.2	37.9	6.3	4.0
1966	0.5	0.2	-1.1	-0.8	37.1	7.4	4.3
1967	1.7	0.2	-1.0	0.5	37.6	7.1	4.4
1968	0.7	0.3	-1.3	-1.0	36.6	8.6	4.8
1969	-1.6	0.3	-1.5	-3.4	33.3	9.4	5.0
1970	0.6	0.2	-1.3	-0.9	32.3	9.6	5.2
1971	1.1	0.3	-1.2	-0.3	32.0	9.2	5.3
1972	-0.2	0.2	-0.9	-1.4	30.6	8.2	5.1
1973	-0.3	0.2	-1.0	-1.5	29.1	9.0	5.5
1974	-0.9	0.3	-1.5	-2.6	26.5	12.0	6.3
1975	2.4	0.3	-1.0	1.1	27.5	12.4	8.2
1976	2.0	0.4	0	1.6	29.1	8.3	8.1
1977	0.7	0.4	-0.4	-0.1	29.1	8.8	7.3
1978	0.8	0.4	-0.7	-0.3	28.8	10.3	7.7
1979	0	0.4	-0.8	-1.2	27.5	11.6	8.4
1980	0.2	0.6	-0.4	-0.8	26.8	12.2	10.6
1981	0.4	0.8	0.4	0	26.8	12.2	13.8
1982	3.0	0.9	1.6	3.7	30.5	8.4	14.8
1983	0.5	0.9	1.9	1.6	32.1	7.0	13.8

Note: For a description of the three factors contributing to the change in the debt/GNP ratio, see text.

Chart 3  
Cyclically Adjusted Federal Receipts and Expenditures  
as a Percent of Trend GNP

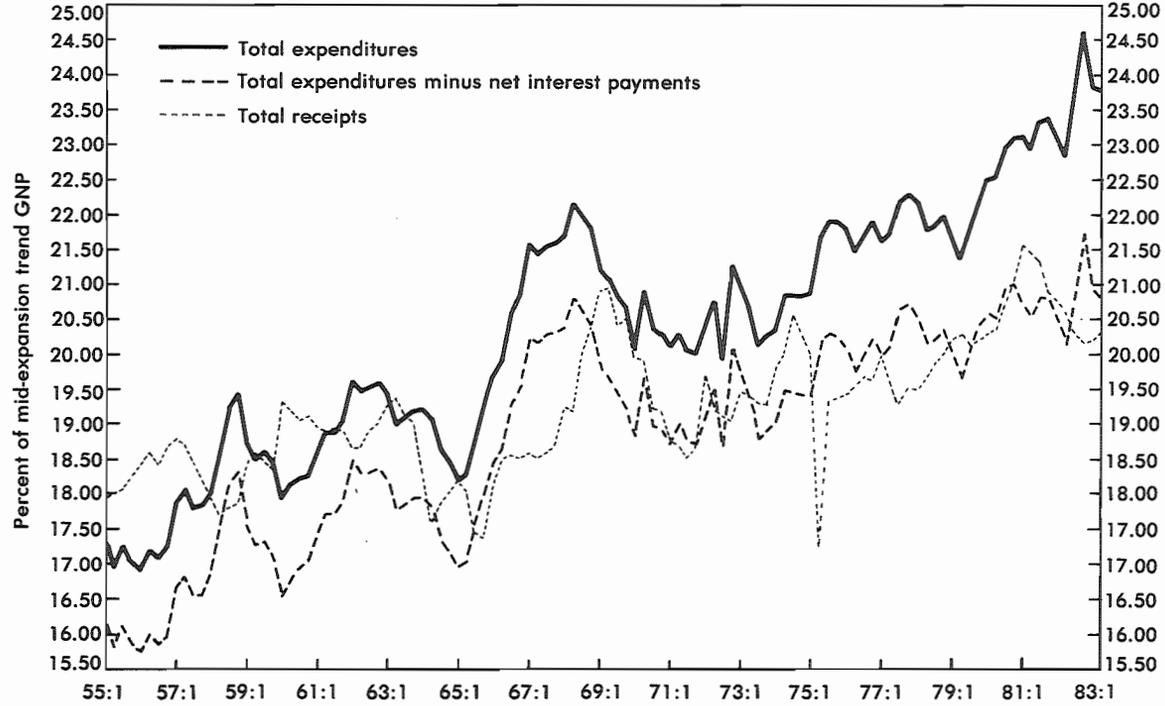


Chart 4  
Treasury Debt Held by the Public as a Percent of GNP

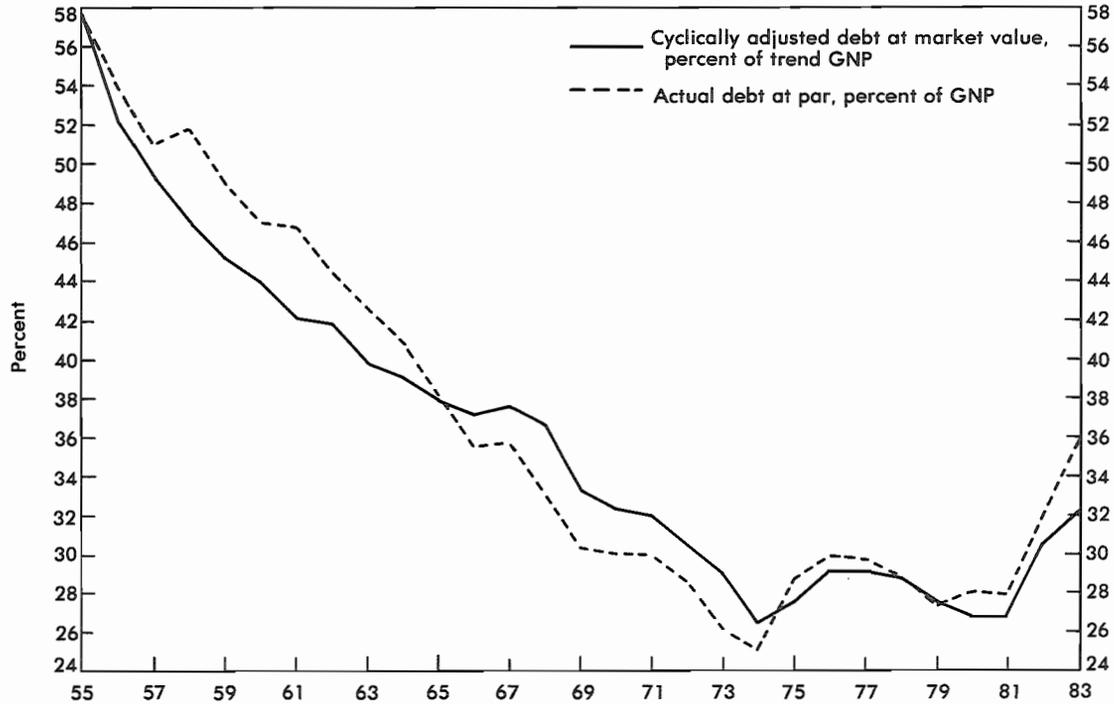
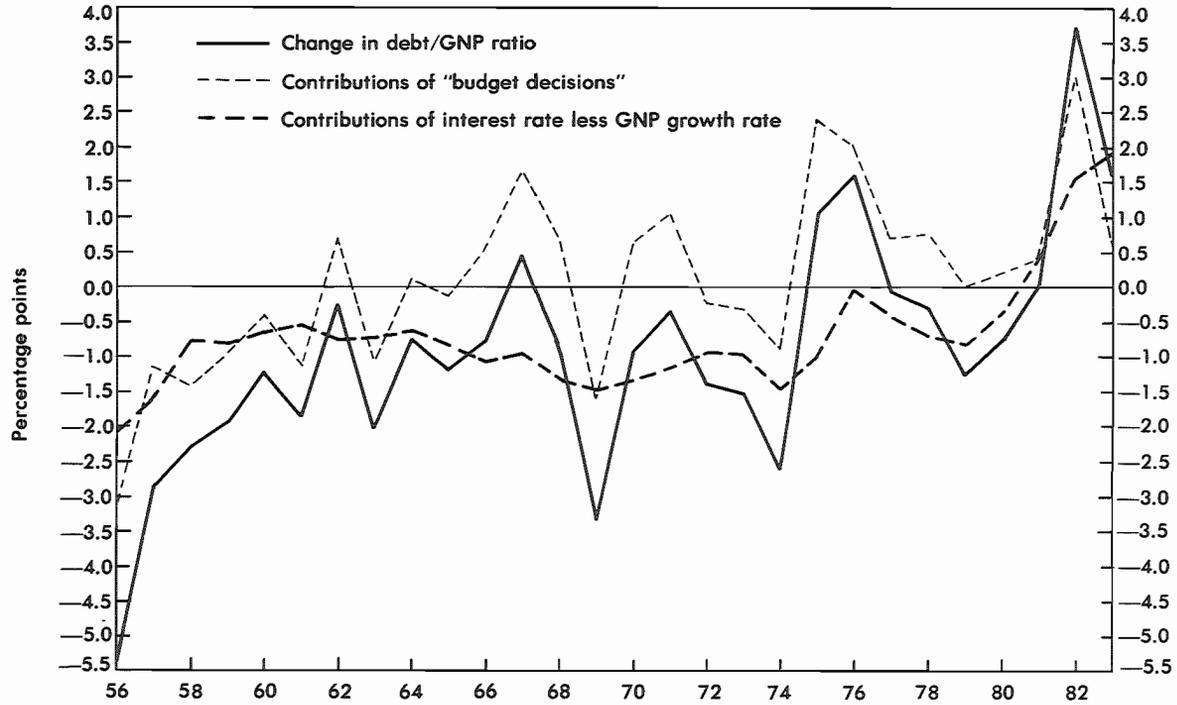


Chart 5  
Sources of Change in the Ratio of Cyclically Adjusted Debt to Trend GNP



From Table 5, it appears that the automatic effects of inflation moderated one of these four factors significantly; namely, the reduction in personal taxes. Had the personal income tax been indexed during 1981-83, the reduction in personal taxes as a percent of GNP would have been appreciably larger, even though the rate of inflation fell during 1981-83. In contrast, the automatic effects of inflation contributed to the corporate tax reduction. The reason is that corporate taxes responded to changes in the rate of inflation as well as to the average rate of inflation, while personal taxes responded only to the average rate.<sup>20</sup>

The rise in the deficit from 1981-83 represents a marked acceleration from the rise in the deficit from 1973-81. The factors accounting for this acceleration differ somewhat from those accounting for the 1981-83 rise. For 1973 to 1981 the deficit as a percent of GNP rose by 0.7 percentage points, 1.4 percentage points less than the 2.1 percentage-point rise from 1981 to 1983. Tables 3 and 4 indicate that two factors alone more than accounted for this acceleration. Personal taxes as a percent of GNP rose by 1.6 percentage points in the former interval and fell by 0.6 percentage points in the latter interval, a swing of 2.2 percentage points. Defense spending fell by 0.4 percentage points during the earlier period and rose by 0.8 percentage points during the latter period, a swing of 1.2 percentage points. The swing in these two categories together was thus 3.4 percentage points, far more than the swing in the deficit.

The other two categories important in the 1981-83 change, corporate profits taxes and net interest payments, are much less important in the acceleration from 1973-81 to 1981-83. The reduction in corporate taxes and the increase in net interest payments during 1981-83 were both continuations of earlier trends, whereas the rise in defense spending and the reduction in personal taxes were reversals of earlier trends.

One other category had a major influence on the 1973-81 to 1981-83 comparisons—an influence that partly offset the reversals in defense spending and personal taxes. That category is transfer payments (as a percent of trend GNP), which rose by 2.0 percentage points from 1973 to 1981 and was virtually unchanged from 1981 to 1983. Thus, the 1.4 percentage point acceleration of the growth in the deficit from 1973-81 to 1981-83 is essentially accounted for by three factors (percentage point contribution in parentheses):

- a shift from increase to decrease in personal taxes (2.2)
- a shift from decrease to increase in defense spending (1.2)

partly offset by

- a shift from increase to no change in transfer payments (1.9)

Tables 5 and 6 indicate that the automatic effects of inflation did not greatly influence this acceleration. The reason is that while the average rate of inflation from 1981 to 1983 was below the average rate from 1979 to 1981, it was not so different from the average rate from 1973 to 1981. Automatic inflation effects on the budget were at a peak in 1979-81 (see Table 2, next-to-last column), and were far below that peak not only in 1981-83 but also in 1973-79.

<sup>20</sup>Ibid., pp. 30-1.

### C. *The Growth in Debt*

Tables 7 and 8 and Charts 4 and 5 show the relationship between the cyclically adjusted budget and the ratio of debt to GNP. Table 7 goes from the cyclically adjusted surplus/deficit to the change in the cyclically adjusted market value of debt. Over the entire period shown, the change in market debt as a percent of trend GNP averages about 0.3 percentage points higher than the surplus/deficit as a percent of trend GNP. Changes in loans as a percent of trend GNP account for most of this difference. The other item in the table, a discrepancy item that includes the reconciliation items between the NIPA and unified budgets, the par-to-market conversion, and other statistical factors, averages about zero, but has sizable effects in individual years.

The change in market debt less net interest payments—the “budget decisions” factor—is one major source of change in the ratio of market debt to trend GNP. The others (corresponding to equation (5) above) are a term that depends on the difference between the effective interest rate on net debt and the growth of GNP, and a term measuring interest receipts from loans. These are shown in Table 8.<sup>21</sup> The Table and Chart 4 show that the debt-GNP ratio fell between 1955 and 1974, moved up until 1977, then down until 1980, and up since then. The rise is projected to continue, at least for the near future (see section III below). The importance of the interest-less-growth rate factor, shown in Table 8 and in Chart 5, is noteworthy. Over the full period, this factor has contributed more than the “budget decisions” factor to the change in slope of the debt/GNP ratio. The contribution of the interest-less-growth factor remains important in 1980–83, contributing approximately the same as the “budget decisions” factor to the recent rise in the debt-to-GNP ratio.

### D. *Comparison with a Cyclically Adjusted Budget Based on a 6 Percent Unemployment Rate*

The results presented so far are all based on mid-expansion trend GNP. Comparison of these results with a cyclically adjusted budget based on a 6-percent unemployment rate reveals some important differences (Table 9 and Chart 6). During 1970–83, the surplus/deficit as a percent of trend GNP shows a strong trend toward deficit in the mid-expansion series and a more moderate trend in the 6-percent-unemployment rate series. The difference is due mainly to expenditures as a percent of trend GNP. The two expenditure numerators are similar, but the trend-GNP denominators diverge steadily. Expenditures as a percent of trend GNP rise by an average of 0.29 percentage points per year during 1970–83 based on the mid-expansion trend, but only by 0.18 percentage points per year based on the 6 percent unemployment rate trend.

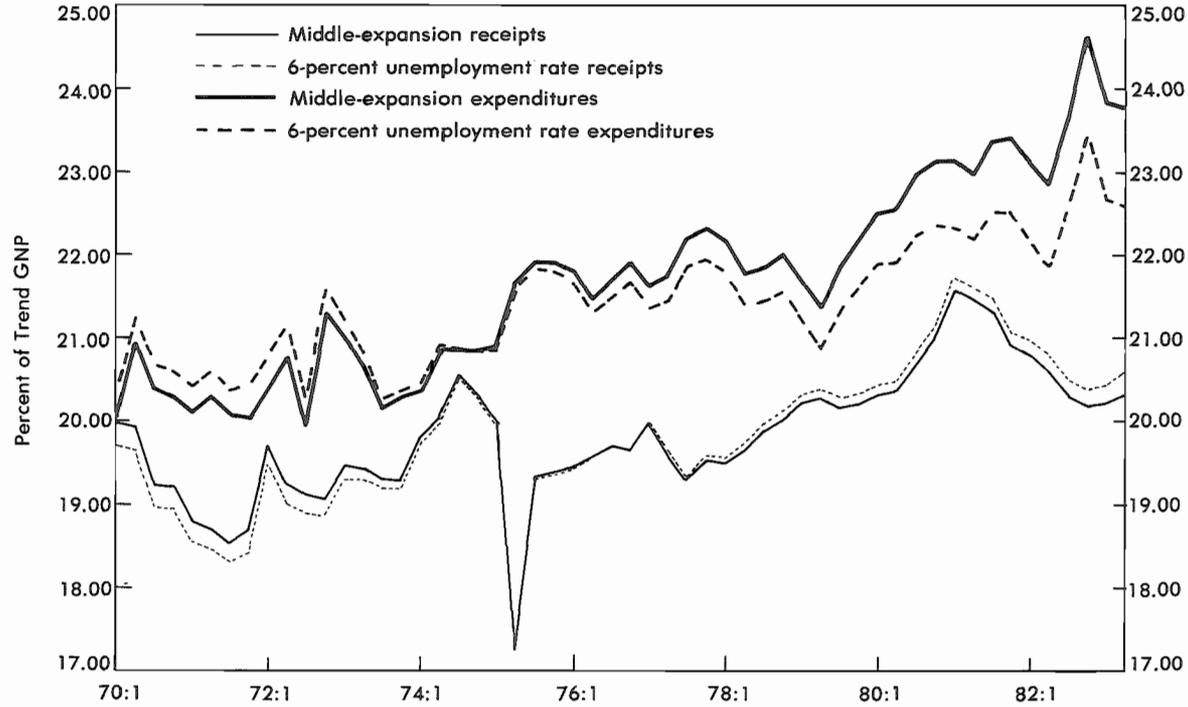
<sup>21</sup>The “budget decisions” factor includes not only expenditures (except for net interest) less receipts, but also net lending and the debt-deficit discrepancy items shown in equation (2).

**Table 9**  
**Comparison of Cyclically Adjusted Budgets Based on Middle-Expansion Trend GNP and Based on a 6 Percent Unemployment Rate Trend GNP, Percent of Trend GNP**

	Total receipts		Total expenditures		Surplus or deficit(-)	
	Mid-expansion trend	6 percent unemployment rate trend	Mid-expansion trend	6 percent unemployment rate trend	Mid-expansion trend	6 percent unemployment rate trend
1970	19.6	19.3	20.4	20.7	-0.9	-1.4
1971	18.7	18.4	20.1	20.5	-1.5	-2.0
1972	19.3	19.1	20.6	21.0	-1.4	-1.9
1973	19.4	19.2	20.5	20.7	-1.2	-1.4
1974	20.2	20.1	20.7	20.8	-0.6	-0.7
1975	19.0	19.0	21.6	21.5	-2.6	-2.6
1976	19.6	19.6	21.7	21.5	-2.2	-2.0
1977	19.6	19.6	22.0	21.7	-2.4	-2.0
1978	19.8	19.9	22.0	21.6	-2.2	-1.7
1979	20.2	20.3	21.8	21.3	-1.6	-0.9
1980	20.6	20.7	22.8	22.1	-2.2	-1.4
1981	21.3	21.5	23.2	22.4	-1.9	-0.9
1982	20.5	20.7	23.6	22.5	-3.1	-1.9
1983 <sup>1</sup>	20.2	20.4	24.2	23.0	-4.0	-2.5

<sup>1</sup>Partly based on the Administration forecast of June 29, 1983.

Chart 6  
 Cyclically Adjusted Federal Receipts and Expenditures  
 Based on Middle-Expansion Trend GNP and Based on 6-Percent  
 Unemployment Rate Trend GNP, Percent of Trend GNP



There can be little doubt that it is the series utilizing the mid-expansion trend that represents more realistically the trend of expenditures in relation to GNP, after correcting for temporary cyclical swings. The series utilizing the 6 percent unemployment rate trend is based on a GNP level to which no one expects the economy to return for several years at the earliest. Its usefulness is as a tool for analyzing and planning the budget in a hypothetical 6 percent unemployment rate economy.

### III. The Ratio of Federal Debt to GNP, 1984-88

To conclude the paper, we examine the effects of alternative assumptions about federal taxes and expenditures, interest rates, and nominal trend GNP growth rates on the cyclically adjusted debt/GNP ratio from 1984-88. This ratio, we have argued, should be the focus of attention in assessing the effects of budget deficits on productivity and long-term growth.

The change in the debt/GNP ratio, substituting equation (2) into equation (5), is:

$$(6) \Delta \left( \frac{D_t}{Y^*_t} \right) = \frac{\sum_{j=1}^{n-1} E^j_t - \sum_{j=1}^m T^j_t}{Y^*_t} + \left( \frac{D_{t-1}}{Y^*_{t-1}} \right) \left( \frac{r_t - g_t}{(1 + g_t)} \right) - \left( \frac{L_{t-1}}{Y^*_{t-1}} \right) \left( \frac{r_t}{(1 + g_t)} \right) + \frac{\Delta L_t}{Y^*_t} + \frac{Z_t}{Y^*_t}$$

where:

$$\Delta \left( \frac{D_t}{Y^*_t} \right) = \text{change in the cyclically adjusted market debt to trend GNP ratio;}$$

$$\frac{\sum_{j=1}^{n-1} E^j_t - \sum_{j=1}^m T^j_t}{Y^*_t} = \text{expenditure and tax influences: the ratio of cyclically adjusted expenditures (except net interest payments) minus taxes to trend GNP;}$$

$$r_t = \text{effective interest rate on cyclically adjusted market debt minus loans;}$$

$$g_t = \text{growth rate of trend GNP, in current dollars (trend real GNP times the actual GNP deflator);}$$

$$\frac{D_{t-1}}{Y^*_{t-1}} = \text{lagged ratio of cyclically adjusted debt to trend GNP;}$$

$$\frac{L_{t-1}}{Y^*_{t-1}} = \text{lagged ratio of loans to trend GNP;}$$

$$\Delta \frac{L_t}{Y^*_t} = \text{ratio of net lending to trend GNP;}$$

$$\frac{Z_t}{Y^*_t} = \text{ratio of debt-deficit discrepancy items to trend GNP.}$$

Budget projections by the Administration and by the Congressional Budget Office cover the key elements in this equation, so that point estimates of the ratio of debt to GNP through 1988 could be based on one of these projections. The track record of these projections is not favorable, however. It seems more useful to explore the effects of a range of plausible assumptions on the debt-to-GNP ratio than to rely on any one projection.

The alternative assumptions we have used are:

- (1) The ratio of expenditures (except net interest payments) less receipts to trend GNP:
  - (a) remains at its 1983 estimated value of 1.0 percent;
  - (b) falls evenly from 1.0 to 0 percent between 1983 and 1988;
  - (c) rises evenly from 1.0 to 1.5 percent between 1983 and 1988.
- (2) The effective interest rate and trend GNP growth rate (current dollars):
  - (a) remain at their estimated 1983 values of 13.8 percent and 7.0 percent, respectively;
  - (b) change to more favorable (for a falling ratio of debt to GNP) values of 11.0 percent for the interest rate and 9.0 percent for the trend growth rate.
- (3) Ratios of loans, debt-deficit discrepancy items, and net lending to trend GNP remain constant at their estimated 1983 values of 6.5 percent, -0.7 percent, and 0.3 percent, respectively.

Table 10 shows the effects of these alternative assumptions on the debt/GNP ratio. There are six cases, corresponding to three alternative assumptions about the ratio of noninterest expenditures less receipts to trend GNP, and two about interest rates and growth rates. One extreme outcome is shown in the lower left box, representing an increase in the noninterest budget deficit ratio combined with a high interest rate and a low growth rate. In this case the debt-to-GNP ratio rises from 32.1 percent in 1983 to 43.7 percent in 1988. The other extreme case is shown in the middle right box, representing progressive reduction in the noninterest deficit to zero combined with a relatively low interest rate and high GNP growth rate. In this case the debt-to-GNP ratio falls from 32.1 percent in 1983 to 31.6 percent in 1988.

**Table 10**  
**Debt-to-GNP Ratio, 1983-88: Effects of Alternative Assumptions**

"Budget decisions" factor assumptions	Debt/GNP ratio (percent) under alternative interest and GNP growth rate assumptions	
	No change in interest or GNP growth rates <sup>1</sup>	Lower interest rates, higher GNP growth rate <sup>2</sup>
<i>No change in "budget decisions" factor<sup>3</sup></i>		
Debt/GNP ratio (percent) for:		
1983	32.1	32.1
1984	33.9	32.6
1985	35.7	33.1
1986	37.7	33.5
1987	39.8	34.0
1988	42.0	34.5
<i>Falling "budget decisions" factor<sup>4</sup></i>		
Debt/GNP ratio (percent) for:		
1983	32.1	32.1
1984	33.7	32.4
1985	35.1	32.5
1986	36.5	32.4
1987	37.7	32.1
1988	38.8	31.6
<i>Rising "budget decisions" factor<sup>5</sup></i>		
Debt/GNP ratio (percent) for:		
1983	32.1	32.1
1984	34.0	32.7
1985	36.0	33.4
1986	38.3	34.2
1987	40.9	35.1
1988	43.7	36.2

<sup>1</sup>Interest rate remains at its 1983 value of 13.8 percent; GNP growth rate remains at its 1983 value of 7.0 percent.

<sup>2</sup>Interest rate falls to 11.0 percent in 1984 and remains there during 1985-88; GNP growth rate rises to 9.0 percent in 1984 and remains there during 1985-88.

<sup>3</sup>Cyclically adjusted noninterest expenditures minus taxes as a percent of trend GNP remains at its 1983 value of 1.0 percent.

<sup>4</sup>Cyclically adjusted noninterest expenditures minus taxes as a percent of trend GNP declines evenly from its 1983 value of 1.0 percent to 0 percent in 1988.

<sup>5</sup>Cyclically adjusted noninterest expenditures minus taxes as a percent of trend GNP rises evenly from its 1983 value of 1.0 percent to 1.5 percent in 1988.

Overall, these results suggest that the ratio of debt to GNP is likely to rise over the next few years. Under the most favorable combination of assumptions, it could fall slightly, but under many less favorable but quite plausible combinations, it would rise by 2 to 12 percentage points. While the ratio is likely to rise, however, even under the least favorable combination of assumptions it would remain far below the 52.3 percent ratio of 1956 (or the still higher ratios of years closer to the end of World War II).

In the present state of knowledge, there is little more we can say. How much reduction in long-term growth follows from a rise of 5 or 10 points in the debt-to-GNP ratio is a question we cannot answer with any confidence. Our hope is that the measures presented in this paper will contribute to a firmer grasp of the economic consequences of deficits.

### Appendix 1.—The Crowding-Out and Expansionary/Contractionary Effects of Fiscal Policy

To examine the consistency of some of the hypotheses about the effects of federal deficits reviewed in the first section of this paper, we analyze a theoretical model of a closed economy with three assets and a government budget constraint. The three assets are real capital goods, high-powered money, and government securities held by the public. Demands for the three assets are given by:

$$(1) \quad \Delta k = \lambda_k [(a_0 - a_1 r + a_2 \pi^e) y - k_{-1}]$$

$$(2) \quad \Delta \left( \frac{H}{P} \right) = \lambda_h [(b_0 - b_1 r - b_2 \pi^e) y - \left( \frac{H}{P} \right)_{-1}]$$

$$(3) \quad \Delta \left( \frac{B}{P} \right) = \lambda_b [(c_0 + c_1 r - c_2 \pi^e) y - \left( \frac{B}{P} \right)_{-1}]$$

The sum of the three left hand variables is equal to private saving plus constant-dollar capital gains.<sup>22</sup> The government budget constraint is:

$$(4) \quad H + B = D = \sum_{i=0}^{\infty} [P_{-i}(g_{-i} - t_{-i}) + r_{-i} B_{-i}(i+1)]$$

Variable definitions are:

- $k$  = constant-dollar stock of real capital
- $H$  = current-dollar stock of high-powered money
- $B$  = current-dollar stock of government bonds held by the public, assumed to take the form of one-period securities
- $D$  = current-dollar stock of government bonds held by the public and by the monetary authority

<sup>22</sup>This private saving identity is the key to the relation of this model to an IS-LM model. Setting private saving plus government saving equal to investment gives an IS relation (with capital stocks). Equation (2) is an LM relation.

- $r$  = interest rate on bonds  
 $P$  = index of the price level  
 $\pi^e$  = expected rate of change of the price level  
 $\pi$  = actual rate of change of the price level  
 $y$  = constant-dollar national income after taxes  
 $g$  = constant-dollar government purchases  
 $t$  = constant-dollar government tax receipts (net of transfer payments)

The three parameters  $\lambda_k$ ,  $\lambda_h$ , and  $\lambda_b$ , are speeds of adjustment. Their values depend on the time span over which the variables are measured; for very short time spans they are assumed to be slightly above zero, and for very long time spans they are assumed to be slightly below 1.0. The other parameters—the  $a$ 's,  $b$ 's, and  $c$ 's—are not time-dependent, and are all assumed to be positive. The coefficient measuring the response of the demand for government bonds to its own interest rate,  $c_1$ , is assumed to be larger than either of the coefficients measuring cross-responses,  $a_1$  and  $b_1$ .

We will use the four equations to solve for capital stock, the interest rate, bonds held by the public, and nominal income (real income times the price level). The stock of high-powered money is assumed determined by monetary authorities, and the total deficit and debt by fiscal authorities. There is no automatic cyclical response of government purchases ( $g$ ) or taxes ( $t$ ), so there is no difference between the actual budget and a cyclically adjusted budget.

The model is incomplete. Since it does not contain an aggregate supply equation or a price-expectation relationship, it does not determine the split of nominal income between output and prices. Furthermore, equations (1)–(3) do not include the present value of expected future tax liabilities or some other representation of so-called “Ricardo-equivalence” notions. A model in which those ideas were prominent could have different properties from the one analyzed here. Finally, the model is limited to a closed economy.<sup>23</sup>

Some additional notation is helpful in presenting the solution. Instead of the three speeds of adjustment  $\lambda_k$ ,  $\lambda_h$ , and  $\lambda_b$ , we will use transformed speeds of adjustment of the form:

$$(5) \quad \lambda'_i = \frac{\lambda_i}{1 - \lambda_i}$$

Note that while each  $\lambda_i$  lies between zero and 1.0, the corresponding  $\lambda'_i$  lies between zero and infinity. For some of the results below, furthermore, we will assume that the two financial speeds of adjustment,  $\lambda_h$  and  $\lambda_b$ , are the same. This is not a necessary assumption for any of the conclusions we draw; but is a plausible assumption that greatly simplifies some of the solutions.

<sup>23</sup>It could easily be extended however, to include an exogenous foreign interest rate, negatively related to domestic bond holdings and related with an uncertain sign to domestic capital stock. In this extended model, a rise in the foreign interest rate would increase domestic nominal income and increase the domestic interest rate. Its effect on the domestic capital stock would be ambiguous.

Finally, we define two composite parameters,  $f_1$  and  $f_2$ , as follows:

$$(6) \quad f_1 = b_1 (a_0 + a_2\pi^e) - a_1 (b_0 - b_2\pi^e)$$

$$(7) \quad f_2 = c_1 (b_0 - b_2\pi^e) + b_1 (c_0 - c_2\pi^e)$$

The solution for nominal income,  $P_y$ , is:

$$(8) \quad P_y = \left( \frac{c_1 - b_1}{f_2} \right) \left\{ \left( \frac{1 + \pi}{\lambda'_h} \right) \Delta H + \left( \frac{\lambda'_h - \pi}{\lambda'_h} \right) H \right\} \\ + \left( \frac{b_1}{f_2} \right) \left\{ \left( \frac{1 + \pi}{\lambda'_b} \right) \Delta D + \left( \frac{\lambda'_b - \pi}{\lambda'_b} \right) D \right\}$$

The signs of the expressions  $(c_1 - b_1)/f_2$  and  $b_1/f_2$  depend on the relative size of  $c_1$  and  $b_1$  and on the sign of  $f_2$ . We have already assumed that  $c_1$  exceeds  $b_1$ . As for  $f_2$ , the two parenthetical expressions in its definition (equation (7)) are, respectively, the equilibrium money-to-income ratio when the nominal interest rate is zero and the equilibrium bond-to-income ratio when the nominal interest rate is zero. If we assume that there is no reason to hold bonds rather than money when the nominal interest rate is zero, then the second of the parenthetical expressions should be zero, and  $f_2$  should be positive.

Under these assumptions, nominal income is directly related to both of two composite expressions, one that depends on the change and level of  $H$  and one that depends on the change and level of  $D$ . In the very short run, when the  $\lambda'$ 's are nearly zero, the change terms in these expressions are much more important than the level terms; nominal income is directly related to the change in high-powered money and to the deficit (the change in  $D$ ). In the very long run, when the  $\lambda'$ 's approach infinity, the change terms vanish; nominal income is then directly related to the level of high-powered money and the level of the debt.<sup>24</sup>

The solution for the interest rate is

$$(9) \quad r = \left( \frac{b_1}{c_1} \right) \frac{\left\{ \left( \frac{1 + \pi}{\lambda'_b} \right) \Delta D + \left( \frac{\lambda'_b - \pi}{\lambda'_b} \right) D \right\} - \left\{ \left( \frac{1 + \pi}{\lambda'_h} \right) \Delta H + \left( \frac{\lambda'_h - \pi}{\lambda'_h} \right) H \right\}}{\left( \frac{c_1 - b_1}{f_2} \right) \left\{ \left( \frac{1 + \pi}{\lambda'_h} \right) \Delta H + \left( \frac{\lambda'_h - \pi}{\lambda'_h} \right) H \right\} + \left( \frac{b_1}{f_2} \right) \left\{ \left( \frac{1 + \pi}{\lambda'_b} \right) \Delta D + \left( \frac{\lambda'_b - \pi}{\lambda'_b} \right) D \right\}} \\ - \left( \frac{c_0}{c_1} \right) + \left( \frac{c_2}{c_1} \right) \pi^e$$

<sup>24</sup>It is interesting that the empirical investigations of reduced-form relationships for nominal income usually imply that  $P_y$  before taxes is related to the level of  $H$  and the change in  $D$ . That is not the form suggested by equation (8).

Under the same assumptions discussed after the solution for  $P_y$ , (9) implies that  $r$  is negatively related to a composite expression that depends on the change and level of high-powered money and positively related to a composite expression that depends on the change and level of government debt. Once more, in the very short run changes in the two assets matter much more than levels, while in the very long run the reverse is true. The reason for this difference between the short run and the long run, fundamentally, is that asset demands are less interest-elastic in the short than in the long run. Consequently, interest rate movements to clear asset markets are highly sensitive to changes in the policy-determined assets  $H$  and  $D$  in the short run and to levels of these assets in the long run.

Equations (8) and (9) together imply that the mix of monetary and fiscal policy affects the interest rate that corresponds to a given nominal income. It follows that the higher the debt for a given nominal income, the lower the capital stock for that income. But it does not follow that higher debt leads to lower capital stock if we allow nominal income to change. To analyze the complete effect of debt on capital stock, we need the solution for capital stock.

The solution for the capital stock is:

$$(10) \quad \left\{ \left( \frac{1}{\lambda'_k} \right) \Delta k + k \right\} P = \frac{f_1}{f_2} \left\{ \left( \frac{1 + \pi}{\lambda'_b} \right) \Delta D + \left( \frac{\lambda'_b - \pi}{\lambda'_b} \right) D \right\} \\ + \left[ \frac{a_1}{b_1} + \frac{f_1}{f_2} \left( \frac{c_1 - b_1}{b_1} \right) \right] \left\{ \left( \frac{1 + \pi}{\lambda'_h} \right) \Delta H + \left( \frac{\lambda'_h - \pi}{\lambda'_h} \right) H \right\}$$

Like the previous two equations, this one is a composite of changes and levels. In the very short run it is a relationship between net investment, the change in high-powered money, and the deficit (the change in  $D$ ). In the long run it is a relationship between the stocks of capital, of high-powered money, and of government debt.

The signs of the relationship, however, are unclear in this case. They depend on the sign of  $f_1$ , which can easily be negative for some parameter values and positive for others. A negative value is consistent with crowding out; that is, with a negative effect of government debt on capital stock. High sensitivity of the demand for capital to the interest rate (a high value of  $a_1$ ) and low sensitivity of the demand for money to the interest rate (a low value of  $b_1$ ) will lead to a negative  $f_1$ . To put it another way; if bonds and capital goods are close substitutes, and bonds and money are not, then crowding out will occur. The reverse conditions—close substitution between bonds and money and not between bonds and capital goods—will lead to a positive  $f_1$ , and therefore no crowding out.<sup>25</sup>

<sup>25</sup>For similar conclusions, see Darrel Cohen and J. Stuart McMenemy, "The Role of Fiscal Policy in a Financially Disaggregated Macroeconomic Model," *Journal of Money, Credit, and Banking*, vol. 10, August 1978, pp. 322-36, and Benjamin M. Friedman, "Crowding Out or Crowding IN? Economic Consequences of Financing Government Deficits," *Brookings Papers on Economic Activity*, 2978:3, 593-641.

However, even in this model, with its ambiguity as to the direction of effect of government borrowing on capital stock, the *ratio* of capital to output is unambiguously negatively related to the *ratio* of the deficit (in the short run) or the debt (in the long run) to nominal income. An increase in debt *can* cause an increase in capital stock, but if it does, it causes a still larger percentage increase in income. The relationship between ratios is:

$$(11) \left\{ \frac{\left( \frac{1}{\lambda'_k} \right) \Delta k + k}{y} \right\} = \left( \frac{f_1}{b_1} + \frac{a_1 f_2}{b_1 (c_1 - b_1)} \right) - \left( \frac{a_1}{c_1 - b_1} \right) \left[ \frac{\left( \frac{1 + \pi}{\lambda'_b} \right) \Delta D + \left( \frac{\lambda'_b - \pi}{\lambda'_b} \right) D}{P_y} \right]$$

Analysis of this simple model thus supports the following propositions:

- (1) With plausible assumptions about parameters, higher deficits in the short run and higher debt in the long run raise nominal income and raise nominal interest rates.
- (2) These results, however, do not imply anything about crowding out—that is, about the effect of deficits or the debt on the capital stock. For some parameter values the model is consistent with crowding out while for others it is not.
- (3) The capital-output ratio in the long run is related to the ratio of debt to income rather than to the deficit. If we are concerned about long-run growth of capital relative to output, then we should, by the logic of this model, focus on the ratio of debt to income rather than on the deficit.

**Appendix 2**  
**Relation of the National Income and Product Accounts (NIPAs) Deficit to the**  
**Change in the Market Value of Debt Held by the Public**

Reconciliation items	Fiscal Years	
	1981	1982
NIPA deficit	57.8	112.2
Minus: <i>Coverage differences</i>	17.3	13.9
Receipts <sup>1</sup>	1.1	1.6
Expenditures: Geographical <sup>2</sup>	-4.5	-4.9
Other <sup>3</sup>	20.7	17.2
<i>Financial transactions</i>	-29.1	-20.0
Receipts	0	0
Expenditures: Net lending	-28.7	-19.3
Net purchases of foreign currency	0	0
Other <sup>4</sup>	-0.4	-0.7
<i>Net purchases of land</i>	7.6	2.2
Expenditures: Outer Continental Shelf	7.8	2.4
Other	-0.2	-0.2
<i>Timing differences</i>	3.5	4.7
Receipts: Corporate income tax	2.8	11.9
Federal and state unemployment insurance taxes	-0.1	-1.1
Withheld personal income tax and social security contributions	3.0	-3.0
Excise taxes	0	0.7
Other	-0.3	-0.2
Expenditures: Purchases of goods & services	-1.7	-2.2
Interest	0.1	-1.0
Transfer payments	0	-0.3
Subsidies less current surplus of government enterprises	-0.3	-0.1
<i>Miscellaneous</i>	0.4	0.5
Receipts <sup>5</sup>	0	0.3
Expenditures <sup>6</sup>	0.4	0.2
Equals: Unified budget deficit	57.9	110.7
Plus: Off-budget deficit	21.0	17.3
Equals: Total budget and off-budget deficit	78.9	128.0
Minus: <i>Asset accounts: Cash &amp; monetary assets</i>	-1.8	-11.9
U.S. Treasury operating cash	2.3	-10.5
Special drawing rights	0.2	0
Reserve position on the U.S. quota in the IMF	-2.4	-1.5
Other	-1.9	0.1
<i>Asset accounts: miscellaneous</i>	-4.3	-1.1
<i>Liability accounts</i>	5.1	5.6
Accrued interest payable to the public	3.0	3.6
Allocations of special drawing rights	0.3	-0.4
Deposit funds	1.8	0.7
Other	0	1.7
<i>Transactions not applied to current year's surplus or deficit</i>	0.7	0.4

**Appendix 2 (Continued)****Relation of the National Income and Product Accounts (NIPAs) Deficit to the Change in the Market Value of Debt Held by the Public**

Reconciliation items	Fiscal Years	
	1981	1982
Equals: Change in outstanding debt held by the public (par value)	79.3	134.9
Minus: Par-to-market conversion <sup>7</sup>	41.7	-79.2
Equals: Change in outstanding debt held by the public (market value)	37.6	214.1

Sources: *Survey of Current Business* (July 1983), p. 56; *Monthly Treasury Statement* (September 1982), pp. 22-3.

## Notes to Appendix 2

<sup>1</sup>Consists largely of contributions for social insurance by residents of U.S. territories.

<sup>2</sup>Consists largely of transfer payments to residents of U.S. territories.

<sup>3</sup>Consists of agencies not included in the unified budget, such as the Postal Service and the Federal Financing Bank, and net purchases of silver and minor coin metal.

<sup>4</sup>Includes capital gains on government loans.

<sup>5</sup>Consists largely of Treasury receipts from sales of foreign currencies to Government agencies.

<sup>6</sup>Consists largely of net expenditures of foreign currencies.

<sup>7</sup>Based on unpublished par-to-market ratios described in W. Michael Cox and Eric Hirschhorn, "The Market Value of the U.S. Government Debt; Monthly, 1942-1980," *Journal of Monetary Economics*, Vol. 11, No. 2 (March 1983), pp. 261-72.

# Discussion

**Barry P. Bosworth\***

Frank de Leeuw and Thomas Holloway have provided us with an interesting paper that covers a wide range of issues connected with measuring the economic effects of the budget. I found the latter parts of the paper which are concerned with analyzing underlying sources of recent change in the budget and the tables that accompany that discussion to be of particular interest.

The first part of the paper is devoted to developing two issues:

1. An alternative to high employment GNP as a means of adjusting for cyclical fluctuations in the budget; and
2. The suggestion that the cyclically adjusted debt-GNP ratio is superior to the deficit-GNP ratio as a means of measuring the long-run crowding-out effect of the budget on the economy.

The authors' concept of an adjusted GNP measure based on the mid-expansion phases for the business cycle seems superior to the usual potential GNP concept of those applications where it is important that the cyclically adjusted series maintain the average level of actual GNP—perhaps, as they suggest, in computing cumulative values such as total debt. In other applications, I find that the aggregate supply or capacity concept of potential GNP is more appealing. The de Leeuw-Holloway measure differs from the Wharton concept of industrial capacity only in using the mid-expansion phase rather than the peak of the business cycle to establish trends. As such it suffers from the same problems discussed before with respect to the Wharton measures of capacity utilization. I find it difficult to accept the underlying notion of regularity to the business cycle that would allow the use of any phase as adequate for cyclical adjustment. I am particularly bothered by a cyclically adjusted GNP measure that implied that the associated unemployment rate has risen from 5.5 percent in 1972 to 8 percent in 1983.

I believe that the discomfort with using potential GNP to measure adjusted fiscal policy results more from the notion of potential GNP as a target. Since nobody expects the economy to reach potential for several years, focusing on the high-employment budget is not an adequate means of evaluating the mix of fiscal-monetary policy along a target path that is far below potential.

I find the second notion of using a debt-to-GNP ratio to evaluate the potential crowding out effects of the budget to be quite interesting. But here I have some questions.

\*Senior Fellow, Economic Studies Program, The Brookings Institution.

a. Doesn't the use of debt/GNP\* ratio to measure crowding out correspond only to an economy that always operates at full resource utilization? Suppose government enacts a temporary tax reduction to assist in recovery from a recession. By doing so the deficit and the stock of debt in future periods are higher, but I don't see that investment is crowded out in the initial period or in the future. The assumption that the complex issue of crowding out of private investment can be simplified to a debt/GNP ratio seems to ignore the stabilization concept that lies behind the advocacy of an active fiscal policy.

Perhaps the authors have in mind some notion of a portfolio balance model where government and private debt are imperfect substitutes for one another (the Friedman paper)—that seems to be implied by the analysis of Appendix A. But certainly one cannot associate private debt with physical capital and government debt with consumption. In other words, I have some difficulty understanding the implied underlying model. It seems to me that one cannot avoid looking at the issue, as do several other papers at this conference, in terms of the deficit (a flow concept) relative to the balance of resource utilization and monetary policy at the time it occurs. I don't, in general, believe that a discretionary budget deficit which originates in a recession imposes costs in future periods. It is not clear what additional information about "crowding out" of private expenditures is provided by looking at the debt/GNP ratio.

Perhaps, de Leeuw and Holloway mean to stress the *change* in the debt rather than the deficit. Those two concepts differ by the inclusion of capital gains and losses in the market value of the debt and of financial transactions in the debt concept.

b. Shouldn't financial assets transactions be excluded from the debt concept? That is, use a measure of debt that corresponds to a cumulation of the NIA deficit plus capital gains. Suppose government credit agencies operated in a fashion identical to private financial intermediaries. We wouldn't report the assets of private financial intermediaries as crowding out the real expenditures of others. The exclusion of financial transactions would also seem to follow from the analysis of Appendix A.

I thought the analysis of budget trends in the second section was the most interesting part of the paper. In Table 2 the authors distinguished between inflation and discretionary policy actions as sources of change in the cyclically adjusted budget. Table 8 provides some additional detail. For example, in seeking the sources of change in the budget deficit from 1981 to 1983, the dominant discretionary action is on the expenditure side. The slowing of inflation is also of considerable importance. The tax cuts seem to count for very little. I wondered if the authors might comment on the difference between their numbers and the projections of CBO and OMB. The projections of those two agencies show a rise of about 1 percent in the ratio of expenditures to GNP between 1981 and 1988 and a drop of 2 to 3 percent in the revenues-to-GNP ratio. In other words, those agencies emphasize the tax cuts far more than expenditures as changing the path of the future deficit. It would be helpful in this regard if the authors could extend their analysis into the 1984-88 period by analyzing the CBO projections on a cyclically adjusted basis.

The material of Table 8 is also of interest in highlighting the importance of the relationship between the real interest rate and the growth of real GNP in projecting the path of debt/GNP. I assume that the interest rate would also be an equally critical factor in determining the path of the deficit. If so, the interest-rate-less-growth factor has added 2 to 3 percent to the annual deficit as a share of GNP in 1982-83 relative to the average of the 1970s. That seems very large compared to the data of Table 4. It is, I believe, only because of the sharp slowdown in their measure of trend GNP in the 1980s. The interest payment data of Table 4 is essentially  $\frac{r \cdot D_{t-1}}{\text{GNP}^*_t}$ , while that of Table 8 is  $\frac{(r-q) \cdot D_{t-1}}{\text{GNP}^*_{t-1}}$ .

Table 8 also provides a good illustration of the importance of coordinating fiscal-monetary policy with respect to a target path for GNP. The difference between  $r$  and  $q$  is basically a disequilibrium concept; but if  $r$  rises because of monetary restraint or  $q$  falls because of low growth prospects, their measure clearly brings out the need for offsetting changes in the budget deficit to maintain the same growth of the debt/GNP ratio.