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SHORT AND LONG RUN

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ABSTRACT

This paper begins by examining the persistence of movements in the U.S. Government's budget posture. Deficits display considerable persistence, and debt levels (relative to GDP) even more so. Further, the degree of persistence depends on what gives rise to budget deficits in the first place. Deficits resulting from shocks to defense spending exhibit the greatest persistence and those from shocks to nondefense spending the least; deficits resulting from shocks to revenues fall in the middle.

The paper next reviews recent evidence on the impact of changes in government debt levels (again, relative to GDP) on interest rates. The recent literature, focusing on expected future debt levels and expected real interest rates, indicates impacts that are large in the context of actual movements in debt levels: for example, an increase of 94 basis points due to the rise in the debt-to-GDP ratio during 1981-93, and a decline of 65 basis point due to the decline in the debt-to-GDP ratio during 1993-2001.

The paper next asks why deficits would exhibit the observed negative correlation with key elements of investment. One answer, following the analysis presented earlier, is that deficits are persistent and therefore lead to changes in expected future debt levels, which in turn affect real interest rates. A different reason, however, revolves around the need for markets to absorb the increased issuance of Government securities in a setting of costly portfolio adjustment.

The paper concludes with some reflections on "the Perverse Corollary of Stein's Law": that is, the view that in the presence of large government deficits nothing need be done because something will be done.

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DEFICITS AND DEBT IN THE SHORT AND LONG RUN[*]

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The return of large-scale fiscal irresponsibility to U.S. economic policymaking has brought back to center stage a set of questions that dominated the public discussion a decade and a half ago but then mostly faded from view during the course of the 1990s: To what extent do government budget deficits, maintained even when the economy's resources are fully employed, raise real interest rates and impair the economy's ability to undertake productive investment? To what extent do they force either the government or the private sector, or both, to borrow from abroad? What implications follow over longer periods of time, as persistent deficits accumulate into an ever larger stock of government debt outstanding and persistent borrowing from abroad accumulates into ever greater net foreign indebtedness for the nation as a whole? In the meanwhile, do deficits stimulate greater real economic activity if resources are not fully employed?

Marx observed that history repeats itself, first as tragedy and then as farce. In the 1980s President Ronald Reagan's fiscal program, combining tax cuts, increased military spending and unwillingness to cut large-dollar federal programs in the nonmilitary sphere, led to post-war record deficits and a doubling of government indebtedness compared to the national income. The consequences included record-high real interest rates, diminished net investment in new factories and machinery, and the transformation of America internationally from a net creditor country to a net debtor. Since 2001 President George W. Bush's fiscal program, combining tax cuts, increased military spending and increases in nonmilitary programs like farm subsidies and prescription drug benefits for the retired elderly, has already led to sizeable (though not record-size) budget deficits. Whether the economic phenomena that accompanied the deficits of the Reagan era will ensue this time as well is the central question under debate.

At the same time, what policies might – or potentially will – narrow or even eliminate this new round of deficits is also very much a part of the national debate on this issue, although that is not the focus of this paper. The route from the Reagan deficits to the surpluses of the late 1990s involved three major changes in budget policy, first under President George H. W. Bush, then under President Clinton, and then after the new Republican majority assumed control of the Congress. The process required six years, not counting the additional time for the new policies, once enacted, to have their effect. (Importantly, the process also involved active participation, albeit in different ways, by elected members of both political parties.) But this time around, six years from the present day will take the United States to the year in which the oldest members of the post-war baby boom generation become eligible for full retirement benefits under Social Security, as well as for Medicare coverage. Hence even a repeat of what happened in the policy

arena last time – if such were possible now – would be unlikely to lead to parallel consequences for the budget and the economy.

This paper begins by examining, in a longer retrospective, how persistent movements in the U.S. Government's budget posture tend to be, and whether the degree of persistence depends on what gives origin to budget deficits in the first place (tax cuts? military spending? nonmilitary programs? attempts at economic stabilization?). The paper then asks what we know, both theoretically and empirically, about the economic effects both of higher debt levels and of the deficits that produce them. The concluding section offers some thoughts on the intellectual tensions created by simultaneously knowing that a situation will not persist indefinitely and seeking to take action to end it.

Debt and Deficits in the Post-War Period

When the government spends more than the revenues it takes in, it must cover the overage by borrowing.[1] Each year's deficit therefore adds to the government's existing stock of outstanding debt. Conversely, when revenues exceed spending the surplus allows the government to pay off rather than roll over its maturing debt, or even to buy back some of its obligations, so that the stock of outstanding debt decreases. For purposes of most economic questions, however, what matters is not the absolute dollar size of the deficit or the debt but

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[1]The government may also draw down any cash balances it maintains, or sell assets. In the context of the discussion here, the ability of most governments (including the U.S. Government) to avoid borrowing by drawing down cash balances is highly limited. Some governments abroad have sold assets in amounts large enough to be significant compared to ongoing budget operations, but their ability to do so is clearly limited as well. The U.S. Government has not done so in modern times.

rather its relationship to economic quantities like national income or, in the case of a deficit, the flow of private saving. Hence taking into account the expansion of economic activity over time must also be an important element of any analysis of the effect of government deficits and debt over time. In compact form, the essential relations are

$$DEFICIT(t) = EXPENDITURES(t) - REVENUES(t) \qquad (1)$$

$$DEBT(t) = DEBT(t\text{-}1) + DEFICIT(t) \qquad (2)$$

$$DEBT(t)/GDP(t) = [1/(1+g))]DEBT(t\text{-}1)/GDP(t\text{-}1) + DEFICIT(t)/GDP(t) \qquad (3)$$

where g is the growth rate of the (nominal) national income.

The United States emerged from World War II with nearly $1.10 of federal debt outstanding for every dollar of the year's national income.[2] Borrowing had been extraordinary, just as the war effort had been. (By 1944 the U.S. Government had commandeered 45% of the entire gross domestic product, even with the services of more than eleven million uniformed military personnel priced at Army-Navy pay scales and those of many senior government officials recorded at $1 per year.) But rapid income expansion in the immediate post-war years, together with a quick return to approximate budget balance, soon reduced the government's relative indebtedness. By 1956 the end-of-war debt load had been cut by half.

As Figure 1 shows, the post-war experience falls into three fairly distinct periods. First, until the end of the 1970s the government continued to reduce its debt relative to the national income, not by running surpluses and buying back its bonds but simply by keeping its annual

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[2]The concept of debt outstanding used here (as in most discussions of this topic), "debt held by the public," treats the government as a unified entity apart from the central bank. In other words, Treasury obligations held in government accounts like the Social Security Trust Fund and the Highway Trust Fund are excluded, but obligations held by the Federal Reserve System are included.

deficits small enough so that the continuing growth of national income (as time passed,
increasingly including a significant inflation component) outpaced the more modest growth in
the outstanding stock of government obligations. In 1959, for example, President Eisenhower
reacted to the sudden emergence of the largest-yet post-war deficit (2.6% of the year's GDP)
with a budget retrenchment that delivered a small surplus the following year.

In many respects the pattern followed during these three and a half decades was parallel
to what the experience had been before World War II, dating back to the founding of the
Republic: government borrowing during each of the nation's wars had increased the debt-to-
income ratio, and with minor exceptions due mostly to temporary economic downturns, the debt
ratio had then declined until the next war occurred. (The one exception that was not so minor
was the depression of the 1930s.) On the eve of the OPEC cartel's quadrupling of oil prices in
1973, the outstanding debt was down to 24 cents' worth for every dollar of the national income.
Despite three recessions in the next eight years, at the end of fiscal 1981 it was still below 26
cents.

The 1980s and early 1990s were different. Now the government was borrowing in
sufficient amounts that even in years when the economy was strong and the nation was not at
war, the debt ratio rose almost continuously. By 1993 the outstanding debt had reached 49 cents
for every dollar of national income, nearly double what it had been twelve years earlier (though
still not even one-third of the way back to the high point reached at the end of World War II).

Since 1993 the debt ratio has fluctuated more irregularly, declining during the years of
shrinking deficits and then actual surpluses – along with rapid but mostly noninflationary
economic growth – in the mid and late 1990s, and most recently, since 2001, beginning to

increase once again. At the end of the government's 2003 fiscal year the debt ratio stood at .36, up from the recent low of .33 two years before. The latest "baseline" projections by the Congressional Budget Office indicate a debt ratio of .38 for the end of fiscal 2004, rising to .41 by the end of the decade.[3]

Figure 2 shows the record of annual deficits, and occasional surpluses, behind this half century of fluctuation in the government's debt ratio – measured once again compared to the national income. The preponderance of deficits throughout, in contrast to the absence of any long-term upward trend in the outstanding debt ratio, immediately reconfirms the importance for this purpose of the economy's growth as indicated in equation (3). The year-by-year pattern also reveals, more or less, the same three distinct periods that stand out in Figure 1. For three decades, deficits, though clearly outnumbering surpluses, were mostly small compared to the national income. Moreover, when larger deficits did emerge – in 1959, or 1968, or 1971-72 – they did not persist. The latter half of the 1970s marked a transition, however, and by the early 1980s deficits had become both persistent and far larger on average, even in relative terms. Beginning in 1993, the deficit shrank, then gave way to a surplus, and then returned in size (albeit not yet so large as in the 1980s and early 1990s). The largest deficit of the post-war period to date has been 6.0% of national income, in 1983.

Although the deficits or surpluses that the government runs clearly reflect underlying policy decisions – most basically, the level at which to set tax rates and how much to spend on which government activities – part of the fluctuation shown in Figure 2 is merely passive.

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[3]Congressional Budget Office, "The Budget and Economic Outlook: Fiscal Years 2005 to 2014" (January, 2004).

Economic downturns depress incomes and profits, thereby reducing tax revenues. To a lesser but also significant extent, recessions also boost spending, as more workers receive unemployment compensation and some elderly workers decide to start drawing Social Security benefits early.   As Figure 3 shows, however, now only for the four decades for which the CBO calculates "standardized-budget" concepts, allowing for the budgetary effects of stronger or weaker economic activity does not change the overall historical experience in a major way.[4] The most sizeable changes are to the Vietnam War period in the 1960s, where the deficit now looks larger (because the economy was over-fully employed), and to the post-OPEC years of the late 1970s and early 1980s, where the deficit now looks smaller (because the economy was under-employed). On this metric the largest deficit of the post-war period has been 4.8% of the national income, in 1986. The 3.4% deficit recorded in fiscal 2003 translates into a 2.8% deficit on a standardized-budget basis. But the basic pattern – mostly small deficits or even surpluses in the early years, then large and persistent deficits in the 1980s and early 1990s, giving way to surpluses in the late 1990s and then deficits again most recently – describes the standardized-budget experience as well.

The Persistence of Deficits and Debt

Whether a government deficit is transitory or persistent is crucial for assessing its economic implications, and the same is true for fluctuations in debt. Especially when the

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[4]The CBO's "standardized-budget" calculation takes account of not only the business cycle but also "other adjustments" including deposit insurance, receipts from auctions of licences to use the electromagnetic spectrum, and contributions from allied nations for Operation Desert Storm. See, for example, "The Budget and Economic Outlook: Fiscal Years 2005 to 2014," Table F-13.

economy's resources are underemployed, either tax cuts or increases in government spending

plausibly stimulate overall economic activity.[5] Such was presumably the case in 2001 and 2002,

just as it was during 1982 and 1983. Even at full employment, fiscal stimulus can, for a while,

lead to production at levels above the economy's potential output. In time, however, active

stimulus enables an economy that started out underemployed to reach full employment (under

most macroeconomic theories it would do so anyway, only more slowly), and any above-

potential production is presumably temporary as well. Much of the concern frequently expressed

about large deficits and rising debt levels focuses on what happens next.

Central to that concern is typically the implications of deficits and debt for capital

formation and, in an open economy, for net foreign borrowing. But both of these are inherently

dynamic processes. Especially in a mature industrialized economy like that of the United States,

a diminished investment rate for a year or two normally has only a minimal impact on the

trajectory of capital accumulation, and hence implies little discernable cost in terms of lower

levels of productivity and diminished living standards in the long or even the medium run.

Similarly, enlarged foreign borrowing, maintained for just a brief period of time, has little

ultimate impact on a country's net creditor or debtor position.

Figure 4a displays the average persistence properties of U.S. Government deficits or

surpluses (measured as a percentage of national income), estimated as a univariate

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[5]See, for example, Elmendorf and Reifschneider (2002) for an empirical investigation of these short- and medium-run effects, including in particular the bearing of forward-looking financial market responses (a key part of the story below in this paper). In recent years a much larger literature has investigated the more aggregative short- and medium-run effects of fiscal policy, albeit without the explicit focus on forward-looking financial markets; see, for example, Fatas and Mihov (2001), Blanchard and Perotti (2002), Gali et al. (2003), Perotti (2004), and the many other papers that these authors cite.

autoregressive process using quarterly data spanning 1959-2003.[6] The (arbitrary) value plotted

for the initial quarter is the standard deviation of the estimated shock to the deficit ratio process

over this sample, .63% of GDP. The dotted lines indicate the two-standard-error confidence

band around the estimated deficit trajectory. As inspection of Figure 2 suggests, the deficit

process exhibits considerable but clearly finite persistence. After an initial further increase, the

deficit begins to decrease a year or so later. By quarter 12 the decay back to the series mean is

half complete.

As is also apparent from the data exhibited in Figure 2, since the Reagan era movements

in the federal government's budget position have become not only larger in scale but also more

persistent. Figure 4b displays the results of estimating the same univariate autoregressive

process using only the post-1980 portion of the sample. Here the standard deviation of the shock

is smaller, .54% of GDP, but the tendency for the deficit to build after the initial shock is both

greater and longer-lasting than in the full sample. The time required for the decay back to the

series mean to be half complete is 17 quarters.

The process by which the deficit goes away presumably includes some combination of

policy responses (raising taxes in response to a deficit, as in 1990 and 1993, reducing spending

as in 1993 and 1995, or cutting taxes in response to a surplus as in 2001) and induced economic

responses (higher national income – and therefore increased revenues – following from fiscal

stimulus, as in the late 1960s and the early and mid 1980s). A simple univariate representation

of this highly complex set of political/economic interactions not only misses the specifics of

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[6]The underlying autoregression includes four lags. The analogous AR(1) process looks
similar, though of course without the "hump."

what is happening but also risks mis-estimating even the summary dynamics of the process. Figure 5 therefore shows the analogous representation estimated from a three-variable vector autoregression including the growth of real output, price inflation, and the deficit ratio (ordered in that way). The more specific question being asked, therefore, is how the deficit ratio responds over time to a initial one-time "deficit shock," meaning a movement in the deficit ratio not attributable to prior movements of either output growth or inflation. Narrowing the inquiry to purely policy-originating deficit movements and explicitly allowing for the additional output growth and inflation that the deficit shock induces along the way leads to reduced estimated persistence for the deficit itself. Here the half-life of the decay is only 7 quarters. In the post-1980 data (not plotted), it is 13 quarters.

What about debt levels? Because changes in the deficit are persistent, and deficits add to the outstanding debt, it is natural to expect debt levels (even compared to the national income) to exhibit an even greater tendency for any initial shock to build up, and for whatever decay back to the baseline takes place to be stretched out over a longer time. As Figure 6 shows, the univariate autoregressive representation of the debt-to-GDP ratio process exhibits just these properties. The post-shock build-up takes the debt ratio to a level more than twice as great as the size of the initial quarter's shock, and the series returns to the level of the initial shock only after 55 quarters. The half life of the entire response is 85 quarters. Estimating a four-variable VAR including output growth, inflation, the deficit, and the debt ratio (in that order) leads to similar but even more pronounced results, shown in Figure 7.[7] In response to an initial "deficit shock,"

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[7]Because the "deficit" variable is actually the surplus, the debt ratio declines in response to a "deficit shock."

the debt level builds for nearly five years and returns to baseline only over a very long time.

Even within the category of policy-originating movements, deficits (and changes in the debt ratio) arise for any number of specific reasons, and some of these initiating events may well lead to different degrees of persistence in the deficit than others. For example, a build-up in military spending, due perhaps to a war, may end after just a few years, while a new entitlement program or some other occasion for increased government spending may continue on indefinitely. Similarly, taxes, once cut, may be politically difficult to raise.[8] Examining the univariate autoregressive representations of standardized-budget spending and revenues confirms that different elements of the federal budget exhibit different degrees of persistence. The half-life with which movements in spending disappear is 22 quarters, while the corresponding half-life for revenues is only 7 quarters. The results shown in Figures 2, 4 and 5 suggest that even deficits attributable to the introduction of new entitlements do not persist indefinitely, however. (The entitlement may go on forever, but in time increased taxes and/or cuts in other spending programs can finance it.) The relevant question is to what extent the degree of persistence in the deficit differs according to the kind of policy action from which it arises.

Table 1 reports the results of investigating this question through a series of four-variable VARs including, in each case, real output growth, inflation, a specific component of the government's budget, and the deficit (in that order, and with both the budget component and the deficit measured as a ratio to GDP). The budget components included, in this one-at-a-time way,

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[8]An interesting question that the analysis in this paper does not take up is whether tax cuts are more irreversible (in this sense of leading to greater deficit persistence) than tax increases. Properly allowing for such asymmetries would probably require a longer data sample, including more instances of major tax increases and reductions, than what the post-war U.S. experience offers.

are defense spending, nondefense spending, total spending, standardized-budget spending, total revenues, and standardized-budget revenues. The question being asked, in each case, is how the deficit responds to a one-time increase in the included budget component.

As Table 1 shows, there are distinct (and somewhat surprising) differences in the persistence of the induced deficit across these six elements of the federal budget. The respective half-lives with which the deficit ratio returns to its baseline after a one-time shock from each of the sources ranges from only 3 quarters, for nondefense spending, to 16 quarters, for defense spending. The persistence of deficits resulting from changes to total spending fall in between, as does that of deficits resulting from revenue changes. (In neither case does using the CBO's standardized-budget measure make a noticeable difference for this purpose.) Hence sustained runs of enlarged deficits, like those of the 1980s and early 1990s, presumably result not from single events but from sustained series of policy measures, repeated or renewed over time.

Finally, what about the debt level? Consistent with the results already reported above, adding the debt ratio as a fifth variable to any of these four-variable VARs delivers a pattern not unlike that shown in Figure 7. When the government increases military spending, or cuts taxes, the result is – for a while – to increase the *deficit* ratio compared to what it otherwise would have been. Until the enlarged deficit has decayed back to its original baseline level, the further result is to raise the *debt* ratio, compared to what it otherwise would have been, as well. In time the induced boost to the deficit ratio disappears. The induced higher debt ratio does so as well, but only over very long periods of time.

Debt Levels, Interest Rates and Capital Formation

What matters for most considerations of public policy is not the government's debt or deficit per se, but the consequences that ensue for key aspects of economic activity. Throughout the post-war era, but especially during the period of sustained larger-than-average deficits and a climbing debt ratio in the 1980s and early 1990s, the central issue in this discussion has been implications for investment and therefore the economy's accumulation of productive capital.

The version of the link between capital formation and the government's fiscal posture that fits most naturally into standard economic theory focuses on the level of outstanding debt. Standard dynamic models of optimal wealth holding typically imply a fixed equilibrium ratio of wealth to income. The key question for these purposes is whether, and if so to what extent, government debt is a part of that wealth. In so far as people anticipate higher tax liabilities in the future, in order to service higher levels of government debt, those anticipated liabilities offset whatever government obligations they hold, leaving their net asset-liability position unaffected.[9] If people do not take such future tax liabilities into account, however – because their consumption-saving behavior is income-constrained to begin with, or because they believe the government will be able to engineer a once-for-all increase in its debt level (that is, they perceive the debt level to be nonstationary), or simply because of limited foresight – then in equilibrium higher government debt levels relative to income imply a lower capital-income ratio. Presumably the question of whether the public perceives the government's debt as a net asset

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[9]This is the position advocated by Barro, beginning in Barro (1974) and in numerous papers thereafter. There remains the possibility that augmenting people's portfolio by a combination of assets consisting of government bonds and liabilities for tax payments against future earnings leaves net wealth unchanged but has effects on asset demand behavior, and hence on market-clearing interest rates and asset returns, nonetheless. See, for example, Fama and Schwert (1977).

need not have a zero/one answer. In fact, attempts to address the question empirically have

delivered answers that virtually span the spectrum between zero and one (and, embarrassingly,

sometimes lie outside that interval).[10]

If the public does perceive part or all of the government's debt as an element of its

overall wealth, so that higher debt means a lower capital stock (in both cases, relative to

income), implied changes in interest rates and asset returns more generally are an important part

of the story. It follows immediately from the diminishing-marginal-returns property of most

standard models of the role of capital in the production process that the lower equilibrium

capital-output ratio implies a higher marginal rate of return. In addition, a higher interest rate on

government debt, and therefore a higher rate of return that investors require to hold capital, are

normally central to the process by which the economy moves from the initial capital-income

ratio to the new, lower equilibrium value. In the short run, before the capital-output ratio has

adjusted, the marginal product of capital is also unchanged and so the higher required rate of

return must result from a fall in the price of capital assets. With a lower price of existing capital,

and a higher required rate of return, investors undertake less new capital formation. In

equilibrium, after the capital-output ratio has fallen (via depreciation in a steady-state economy,

or merely via reduced accumulation when income is growing over time), the price of capital

assets returns to the reproduction level and the higher required rate of return corresponds to the

higher marginal product.[11]

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[10]For a recent survey of such results, see Elmendorf and Mankiw (1999). See also
Bernheim (1987) and Seater (1993) for prior surveys.

[11]This rendering of the process follows the classic account by Tobin, in a series of papers
beginning with Tobin (1963), where the key variable is the required rate of return, and Tobin

A long history of efforts to establish an empirical relationship between observed deficits and observed interest rates – the first link in this causal chain – has generated widely varying estimates.[12] One difficulty is the need to separate out the effect of the business cycle, including the response of monetary policy. (A weak economy temporarily makes both the deficit and the debt larger, and it also often leads the central bank to lower interest rates.) Another is distinguishing real versus nominal interest rates. Yet another is that, apart from short-term interest rates (which are controlled by the central bank anyway), rates of return set in speculative asset markets are inherently forward-looking, and so what matters is not the debt or deficit at the moment but what investors expect the government's fiscal posture to be at some relevant future time.

More recently, however, research that seeks to sidestep some of these problems by relating anticipated future real interest rates to anticipated future debt levels has achieved a fairly high degree of consensus. Laubach (2003) uses the observed yield curve on U.S. Treasury obligations, together with a set of survey-based measures of inflation expectations, to infer the real ten-year interest rate implied for five years in the future, and projections made by either the CBO or the Office of Management and Budget to measure the level of government debt outstanding (relative to national income) expected to exist five years later. A battery of regression results deliver an effect of anticipated future debt levels on expected future interest rates in the range of 2.9 to 5.3 basis points for every one percentage point on the debt ratio. Engen and Hubbard (2004) carry out a similar analysis, also using the Treasury yield curve and

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(1969), where the key variable is the price ratio.

[12]See, for example, the estimates surveyed in Tables 1 and 2 of Gale and Orszag (2002).

the CBO projections of future debt levels, and controlling for a more expansive set of further influences. Engen and Hubbard's estimated impact on implied future interest rates varies from 3.4 to 5.8 basis points for every one percentage point on the debt ratio. Moreover, as both Laubach and Engen and Hubbard argue, estimates in these (nearly identical) ranges are plausibly consistent with the standard underlying model of optimal capital accumulation, with conventional values for key parameters like the capital-income ratio and the capital coefficient in the production function.[13]

These estimated effects are large, at least in the context of the observed fluctuations in interest rates and in the government's debt ratio since World War II.[14] From 1962 (when the data on the ten-year rate begin) to the present, the nominal yield on ten-year U.S. Treasury bonds has exceeded inflation (as measured by the GDP deflator) by an average 3.3%. This difference, over more than four decades, is probably a reasonable approximation to the average level of real interest rates expected by investors during this period.[15] Carrying out the analogous calculation for each decade individually implies average real interest rate levels ranging from 0.7% in the 1970s to 5.5% in the 1980s. Over a period as short as a single decade, of course, actual inflation

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[13]Laubach (2003) and Engen and Hubbard (2004) also provide useful references to prior papers in this line of research.

[14]They are large also in the context of familiar estimates of the rate of return on capital. Poterba (1998), for example, estimated that the pre-tax marginal product of capital employed in U.S. nonfinancial corporate business was 8.5%. Elmendorf and Mankiw (1999) suggest a 6% rate of return on aggregate capital.

[15]For taxable borrowers, the average real interest rate would have been significantly smaller on an after-tax basis, and so the effects due to anticipated changes in debt levels, as estimated by Laubach and by Engen and Hubbard, are even larger by comparison. With a 35% marginal tax rate (the current tax on corporate income for most corporations), the average nominal interest rate of 7.3% and inflation rate of 4.0% over 1962-2003 implies average real interest rates of 3.3% pre-tax but only 0.7% post-tax.

may repeatedly differ from what was expected, and so these decade-averages may not be a

reliable guide to the levels of real interest rates that investors actually anticipated. In all

likelihood, investors underestimated what inflation would be in the 1970s, and overestimated

inflation in the 1980s, so that the respective average differences between nominal interest rates

and actual inflation during these decades far overstates the range within which anticipated real

interest rates vary. In any case, the point is that the range is not very wide.[16]

Compared to that range, the impact due to, for example, the increase in government debt

during the Reagan-Bush I period is sizeable. The outstanding debt rose from less than 26% of

national income at the end of fiscal 1981 to more than 49% in 1993. At, say, 4 basis points per

percentage point of movement in the debt ratio – about in the middle of range estimated both by

Laubach and by Engen and Hubbard – the consequence was an increase of 94 basis points in the

prevailing real interest rate. The corresponding decline in real interest rates implied by the

subsequent fall in the debt ratio to the recent low of just over 33%, at the end of fiscal 2001, was

65 basis points. (As of the end of fiscal 2003, the latest rise in the debt ratio, to just over 36%,

implies only a 12 basis point increase in real interest rates.)

Establishing evidence for the second link in the chain – the effect of higher interest rates

in reducing capital accumulation – has remained more problematic. With reference again to the

Reagan-Bush I period, measured rates of investment did decline as the debt ratio rose in the

latter half of the 1980s and on into the 1990s, and they revived as the debt ratio declined in the

latter half of the 1990s (more on this below). But to what extent these movements were a direct

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[16]As would be expected, the range of variation of real interest rates implied by survey-based expectations of inflation is much narrower. See, for example, the values for the U.S. plotted by Engen and Hubbard in their Figure 15.

consequence of the rising and then falling debt levels, as opposed to effects associated with

deficit financing, remains unclear. Further, unraveling the consequences of fiscal policy from

conceptually separate influences like business cycle movements, trends in foreign competition,

the introduction of computers and other new technologies, changing oil prices, and so on, is a

task that apparently lies beyond the scope of what the economics profession has been able to

agree upon to date. Efforts to pin down empirically such parameters as the interest-elasticity of

investment (or, equivalently for this purpose, the dependence of investment on the relationship

between the market price and reproduction cost of capital) have also led to little consensus. The

one point on which most research does agree, however, is that the diminishing-marginal-returns

effect associated with the role of capital in the production process is sufficiently gradual – in

other words, the production function has sufficiently small curvature – that equilibrium changes

in returns on the scale that either Laubach or Engen and Hubbard would attach to the Reagan-

Bush I debt build-up imply large changes in the economy's equilibrium capital-output ratio.

Is There Something Special about Deficits?

A further source of frustration, for anyone attempting to apply the lessons of economic

theory to analyze how actual fiscal policy decisions affect economic activity, is that while the

theory refers primarily to *debt levels* the public discussion of fiscal policy mostly focuses on

deficits. The two are related, of course, as equation (3) shows, in that whether the debt-to-

income ratio rises or falls depends on the size of the deficit in relation to the existing debt level

and the growth of nominal income. But especially for a country like the United States, where the

outstanding debt is already large, even a sizeable deficit makes only a small difference for the

debt ratio if it is sustained for only a small number of years.

One resolution of this tension is simply to assume that deficits matter only if they are large enough, and sustained long enough, to matter via changes in the debt ratio – as happened, for example, during the debt build-up of the 1980s and early 1990s. By contrast, if the implied change in the debt ratio is small, then the sequence of portfolio adjustments outlined above is minor as well, with few if any consequences for interest rates, asset returns, or especially real economic activity.

The puzzle that remains, however, is what makes this stock-oriented portfolio balance conception consistent with the requirement that patterns of economic activity also satisfy, at each point in time, the saving-investment constraint

$$SAVING(t) - DEFICIT(t) = INVESTMENT(t). \qquad (4)$$

Again especially for an economy like that of the United States, where private saving is normally only a small share of the national income, even a short-lived deficit that is also modest compared to national income may nonetheless bulk large compared to saving and therefore require large adjustments in other key economic flows. To the extent that private saving does not adjust in step with the government deficit along the lines suggested by Barro, the implication is that even deficits not associated with a significant change in the government's outstanding debt ratio imply what may be large changes in the economy's investment flows. To be sure, there is no shortage of theoretically understood market mechanisms that would bring such changes about: the most familiar are rising (real) interest rates that depress the domestic component of investment and appreciating (real) exchange rates that increase imports relative to exports and hence depress net foreign investment. The question is what causes interest rates to rise, and exchange rates to

appreciate, if deficits matter only by changing the stock of debt outstanding and that change is small because the deficit is only temporary.

The experience of the U.S. economy's saving-investment balance (measured net of depreciation on each side) summarized in Table 2 makes the question clear.[17] In the early 1980s the federal deficit quadrupled, on average, from the level of the prior two decades. The deficit then ebbed some in the latter half of the decade, as the economy returned to full employment, but rose again in the early 1990s. In the late 1990s the budget was in surplus on average. Until the latter half of the 1990s there was no indication that private saving was moving to offset changes in the federal government's fiscal posture. Instead, the private saving rate declined sharply in the late 1980s, and it declined further in the early 1990s.[18] In the late 1990s the decline in the saving rate continued, now in the presence of a turnaround in the federal budget. (Whether to think of this latest movement as a Ricardian response, or simply a continuation of the downward trend that began well over a decade earlier, is a question outside the scope of this paper.)

In the face of deficits that were large compared to the flow of private saving – and the more so because private saving not only did not increase as the deficit widened but moved in the

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[17]The data in Table 2 are from the National Income and Product Accounts, and so the deficit measure does not exactly match that shown in Figure 2 above.

[18]A substantial literature at the time questioned whether these movement might be consistent with the Ricardian idea nonetheless, either because of technical mismeasurements (most prominently, the treatment of pension contributions) or because the relevant measure of saving from the Ricardian perspective includes changes in wealth due to capital gains, which the NIPA excludes. A rough summary of that literature is that allowing for such additions would eliminate the decline in the private saving rate during this period, but would not produce an increase, as the Ricardian proposition would imply in the presence of historically out-sized deficits. For purposes of this discussion, however, the point is that even if the private sector perceives greater wealth because of capital gains, in the absence of an increased flow of saving the flow of investment must decline.

other direction – both the domestic and the net foreign components of U.S. investment declined

in the latter half of the 1980s and on into the early 1990s. By the early 1990s, net private

domestic investment as a share of national income had fallen by more than one-third compared

to the average of the 1960s and 1970s. The decline in the plant and equipment component of

domestic investment was nearly one-half. In the latter half of the decade, as deficits gave way to

surpluses, the investment rate recovered almost back to the 1960s-1970s average level, both for

private domestic investment overall and for plant and equipment. In the meanwhile, net U.S.

investment abroad turned from positive in the 1960s and 1970s (as it had been ever since World

War I) to negative in the 1980s and beyond. Moreover, the negative foreign investment flows

were, and have remained, large compared to domestic investment.

One answer, but only a partial answer, is that U.S. real interest rates rose and dollar

exchange rates appreciated in the 1980s because investors understood that the deficits of the time

were the product not of temporary economic weakness, as in the past, but of a new set of fiscal

policies that implied large deficits for some years to come and therefore, in time, a significantly

higher debt ratio. The reason this answer is only partially satisfactory is that if the opposite had

been true – that is, if the deficit had been large but had not persisted beyond a few years, so that

the increase in the debt ratio had been minimal – during those years some other component(s) of

the economy's saving-investment balance would have had to adjust anyway. In the absence of

higher real interest rates and dollar exchange rates, it is not clear what market mechanism would

have induced those adjustments.

An alternative conception is that, because of investors' ability to rebalance their

portfolios immediately and costlessly, deficit flows matter in ways apart from the changes they

create in the stock of outstanding debt. There has long been evidence that financial flows more generally have an impact, often sizeable albeit temporary, on interest rates and asset returns.[19] There is also evidence that personal income matters for consumer spending, and business cash flows matter for physical investment. In each case it is possible to conjecture that what appears to be an effect of flow variables per se is merely the effect of anticipated future changes in asset or wealth stocks, and that current flows only appear to matter because they are the basis on which investors and other decision makers form their expectations. But in the presence of costly adjustments, or borrowing constraints, this need not be the entire explanation.

A more detailed examination of the U.S. experience with fluctuating deficits (and sometimes surpluses) further adds to the impression that deficit flows matter. Figures 8a and 8b show the year-by-year comovements of the deficit (actually, net federal saving from the National Income and Product Accounts) with the economy's net private domestic investment and the plant and equipment component of net investment, over the last half-century, with all three flow variables measured as percentages of GDP. Net private domestic investment exhibits a substantial amount of covariation with the deficit (the simple correlation is .51). The covariation is smaller but still readily visible for net plant and equipment investment (correlation .31). Figure 9 shows the corresponding comovement of the deficit with U.S. net foreign investment. Here the two series exhibited a substantial covariation until the late 1990s but then moved sharply in opposite directions. (The correlation for the entire sample is just .15.)

In order to isolate the effect of fiscal actions on investment, holding aside the effect of economic weakness in simultaneously widening the deficit and depressing investment, Figure

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[19]See, for example, Friedman (1992).

10a shows the response of *gross* private investment to a "deficit shock," as estimated from a

four-variable VAR including output growth, inflation, the deficit and investment, in that order.[20]

The initial one-quarter deficit shock (actually an increase in the surplus) leads to an immediate

increase in the investment rate that is statistically significant and that lasts for five quarters.[21]

Interestingly, the estimated trajectory then indicates a decline, although it is not statistically

significant. Figure 10b shows analogous results for a VAR with gross investment in plant and

equipment. Here the increase in investment spurred by a one-quarter deficit shock (again,

actually an increase in the surplus) lasts for two years. Once again, the estimated trajectory

indicates a decline thereafter, although it is not statistically significant.

In sum, the evidence appears to show that, on average, deficits do "crowd out"

investment, including investment in plant and equipment in particular. It is always possible, of

course, that what appear to be consequences of deficit flows are really just consequences of

changing debt stocks in disguise: over the post-war period deficits have been persistent – more

so since the 1980s – and investors, perceiving this persistence, have reacted by moving real

interest rates (and exchange rates) by enough to generate the observed response in investment

flows. Perhaps if investors had not seen deficits as persistent, interest rates would have

responded in a more muted way, and investment flows would have remained virtually

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[20]Quarterly data in the National Income and Product Accounts are available for gross
investment but not net investment.

[21]It is somewhat surprising that the effect of deficits in reducing investment occurs
immediately. Especially when the economy is operating below full employment, a deficit might
be expected initially to "crowd in" investment, either through the traditional "accelerator" effect
(including effects that operate by stimulating business cash flows) or by the kind of portfolio
effects suggested in Friedman (1978), including effects operating via either interest rates or asset
prices. But there is no evidence here of any such short-run "crowding in."

unaffected. But in that case some other element of the saving-investment balance – by elimination, private saving – would have to have responded in a way quite different from the historical experience. Alternatively, to the extent that investors either cannot or simply do not accomplish changes in their portfolio allocations without cost, financial flows also matter independently of the changes that they effect in the corresponding asset stocks, and in particular the government's deficit matters apart from just the associated change in its debt outstanding. The observed experience is certainly consistent with this interpretation as well.

Concluding Remarks: The Perverse Corollary of Stein's Law

Government deficits, sustained year after year even when the economy is operating at full employment, reduce net capital formation and induce foreign borrowing. Both effects accumulate over time. Both are harmful. As Table 2 shows, from the 1960s through the first half of the 1980s the United States on average devoted 4.2% of its national income to net investment in plant and equipment. Since then the average net investment rate has been just 3.0%.[22] Even without allowing for the induced higher output along the way, maintaining a 4.2% net investment rate since 1985 would have given the country approximately 16% more private capital today. With a capital coefficient in the production process of 1/3, that higher capital intensity would have meant a national income some 5% greater – roughly $500 billion per year in a $10 trillion annual economy. One can speculate endlessly about what the country would or could do with an additional $500 billion per year.

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[22]The calculation here goes through 2002. Net investment data are not yet available for 2003.

In the meanwhile, given the deficits that the government ran during much of this period, the only way the U.S. economy managed to achieve even a 3.0% average investment rate was by borrowing heavily from abroad – on average an amount equal to 2.1% of the national income. The result has been a massive accumulation of net foreign indebtedness that is ever greater not only in absolute dollars but in relation to the size of the U.S. economy. The United States was a net creditor country until either 1986 or 1989, depending on whether assets and liabilities are measured at book or market values. As of yearend 2002, the country was a net debtor in the amount of either $2.4 trillion or $2.6 trillion. No one knows whether, or if so when, this large and growing net foreign debt position will create the conditions required for turmoil in the dollar exchange market, or, even more importantly, lead to an erosion of American influence in world affairs parallel to what has happened historically to prior creditor countries that have turned into net debtors.

For a while, in the latter half of the 1990s, changed fiscal policies – affecting both taxes and government spending – not only eliminated the government's deficit but generated a surplus. That experience proved short-lived. New policies, instituted beginning in 2001, rapidly returned the budget to deficit. Moreover, that deficit is already large compared to what the private sector of the U.S. economy saves – in all likelihood the deficit will exceed 4% of the national income in this fiscal year – and it leads directly into the long-anticipated period when the federal government will come under even more intense fiscal pressures stemming from the changing demographic composition of the country's population. The resulting prospect is even less investment in productive capital, or yet further net accumulation of foreign debt, or both.

Oddly, the lesson many Americans seem to have drawn from the experience of the past

two decades is that nothing need be done. One version of this argument is that since the country survived the Reagan-Bush I deficits with no ill effect, deficits are therefore harmless. This view is simply false. While the magnitudes are subject to debate – and they always will be – the reduced capital formation and build-up of net foreign debt that followed the enlarged deficits of the Reagan-Bush I period are now part of the U.S. economic-historical record.

A different version of the argument that nothing need be done, one that is impossible to address on the economics alone, is what might be called the Perverse Corollary of Stein's Law.[23] This argument acknowledges the long-run damage done by a policy of large and continuing deficits but concludes, in effect, that nothing need be done because something will be done: in time the Reagan-Bush I deficits "took care of themselves," and the same will happen this time. This argument has the virtue of not directly ignoring the relevant economic experience. It also appears to reflect a practical, real-politik approach to the making of economic policy. It is clearly of great appeal to opponents of tax increases, or cuts in spending, or any other changes that, if enacted, would reduce the government's budget imbalance.

This argument is (in a phrase once used by Jonathan Edwards) "almost inconceivably pernicious."[24] The Reagan-Bush I deficits did not take care of themselves, but shrank and ultimately gave way to surpluses only as a consequence of a series of visible policy actions, most prominently in 1990, 1993 and 1995. To ignore those key policy changes is to misrepresent the relevant experience no less than to ignore the reduced capital formation and increased foreign

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[23]The late Herb Stein famously remarked that if something can't go on indefinitely, it won't.

[24]Jonathan Edwards, "Letter to John Erskine," August 3, 1757, reprinted in The Works of Jonathan Edwards, vol. 16, pp. 719-720.

borrowing that occurred along the way. To suppose that some parallel set of policy changes will simply ensue on its own this time around is either to ignore how economic policy is made or (perversely, from the perspective of this argument) to posit some imminent crisis that will compel action by force majeur. Either is an invitation to continued fiscal irresponsibility.

References

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

Blanchard, Olivier, and Perotti, Roberto. 2002. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." Quarterly Journal of Economics, 117 (November), 1329-1368.

Bernheim, B. Douglas. 1987. "Ricardian Equivalence: An Evaluation of Theory and Evidence." NBER Macroeconomics Annual (Cambridge: MIT Press).

Edwards, Jonathan. 1757. "Letter to John Erskine." Miller et al. (eds.), The Works of Jonathan Edwards (New Haven: Yale University Press), vol. 16.

Elmendorf , Douglas W., and Mankiw, N. Gregory. 1999. "Government Debt." Taylor and Woodford (eds.), Handbook of Macroeconomics (Amsterdam: Elsevier Science).

Elmendorf, Douglas W., and Reifschneider, David L. 2002. "Short-Run Effects of Fiscal Policy with Forward-Looking Financial Markets." Mimeo: Board of Governors of the Federal Reserve System.

Engen, Eric, and Hubbard, R. Glenn. 2004. "Federal Government Debt and Interest Rates." Mimeo: National Bureau of Economic Research.

Fama, Eugene F., and Schwert, G. William. 1977. "Human Capital and Capital Market Equilibrium." Journal of Financial Economics, 4 (January), 95-125.

Fatas, Antonio, and Mihov, Ilian. 2001. "The Effects of Fiscal Policy on Consumption and Employment." Mimeo: INSEAD.

Friedman, Benjamin M. 1978. "Crowding Out of Crowding In? The Economic Consequences

of Financing Government Deficits." Brookings Papers on Economic Activity (No. 3), 593-654.

Friedman, Benjamin M. 1992. "Debt Management Policy, Interest Rates, and Economic Activity." Agell et al, Does Debt Management Matter? (Oxford: Oxford University Press).

Gale, William G., and Orszag, Peter R. 2002. "The Economic Effects of Long-Term Fiscal Discipline." Mimeo: Brookings Institution.

Gali, Jordi, Lopez-Salido, J. David, and Valles, Javier. 2003. "Understanding the Effects of Government Spending on Consumption." Mimeo: Universitat Pompeu Fabra.

Laubach, Thomas. 2003. "New Evidence on the Interest Rate Effects of Budget Deficits and Debt." Mimeo: Board of Governors of the Federal Reserve System.

Poterba, James. M. 1998. "The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital Stock Data." Carnegie-Rochester Conference Series, 48 (June), 211-246.

Perotti, Roberto. 2004. "Estimating the Effects of Fiscal Policy in OECD Countries." Mimeo: IGIER.

Seater, John J. 1993. "Ricardian Equivalence." Journal of Economic Literature, 31 (March), 142-190.

Tobin, James. 1963. "An Essay on the Principles of Debt Management." Commission on Money and Credit, Fiscal and Debt Management Policies (Englewood Cliffs, N.J.: Prentice-Hall).

Tobin, James. 1969. "A General Equilibrium Approach to Monetary Theory." Journal of Money, Credit, and Banking, 1 (February), 15-29.

Table 1

Persistence of Deficits in Response to

Movements in Specific Budget Components

Budget Component	Half-life in Quarters
Total Expenditures	9
Defense Expenditures	16
Nondefense Expenditures	3
Standardized-budget Expenditures	9
Total Revenues	7
Standardized-budget Revenues	7

Table 2

Elements of the U.S. Saving-Investment Balance

Years	Federal Budget Deficit	Net Private Domestic Investment	Net Plant & Equipment Investment	Net Private Saving	Net Foreign Investment
1961-80	0.9	8.2	4.2	9.9	0.4
1981-85	3.8	7.1	4.3	10.2	-1.1
1986-90	3.1	6.5	3.2	7.9	-2.3
1991-95	3.6	4.9	2.3	7.0	-0.8
1996-2000	-0.2	7.2	3.8	5.2	-2.4

Notes: Figures are percentages of gross domestic product.
Source: National Income and Product Accounts.

Figure 1
Outstanding Debt Held by the Public as a Percentage of GDP, 1946-2003
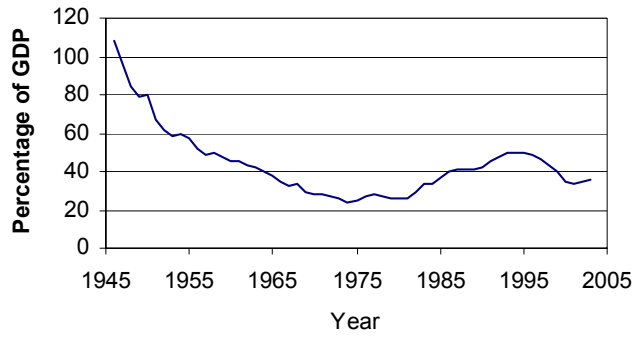
Figure 2
Unified Federal Surplus/Deficit as a Percentage of GDP, 1946-2003
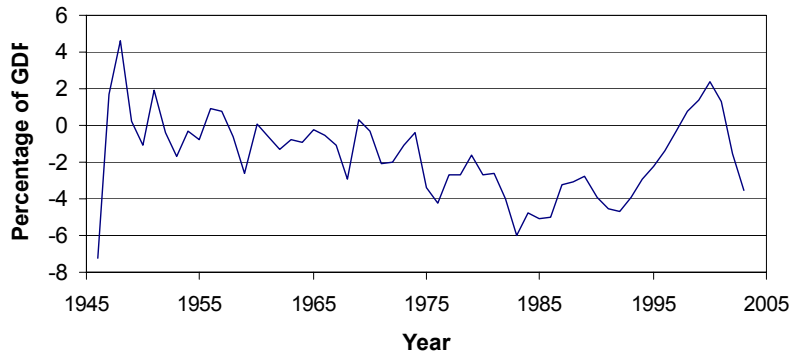
Figure 3
Standardized-Budget Surplus/Deficit as a
Percentage of Potential GDP, 1962-2003

Figure 4a

Deficit Persistence (Univariate Representation)

Quarters

Figure 4b

Deficit Persistence, Post-1980

Quarters
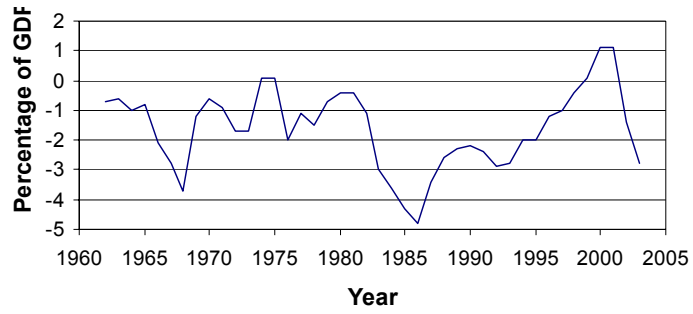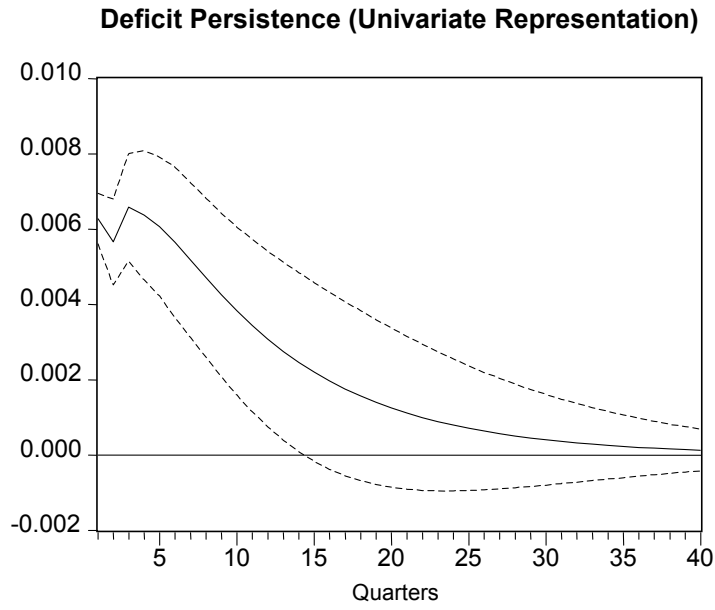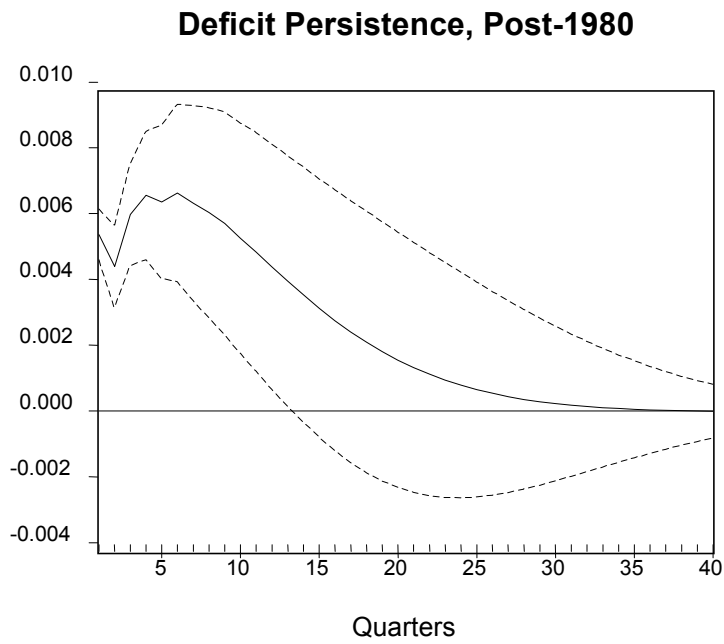
Figure 5

Deficit Persistence (VAR Representation)

Quarters
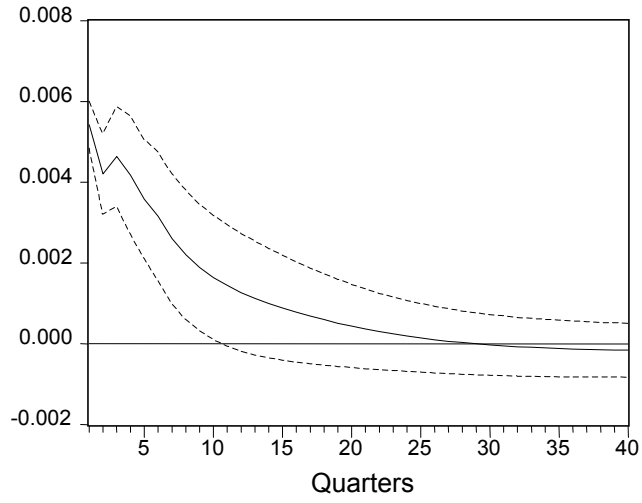
Figure 6

Debt-Ratio Persistence

Quarters
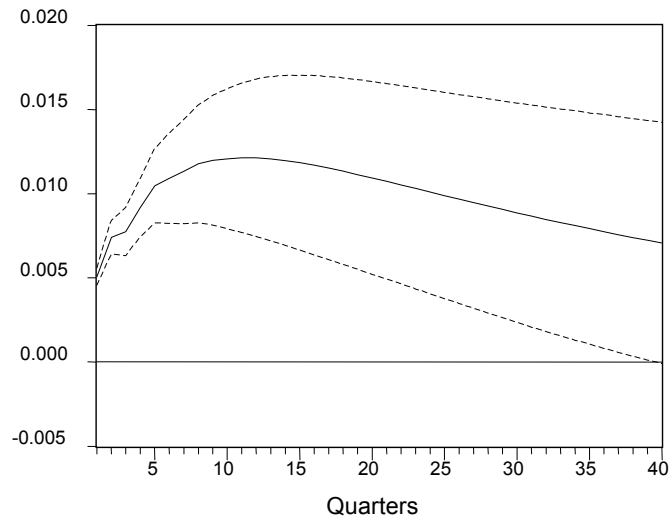
Figure 7

Debt-Ratio Response to Deficit Shock
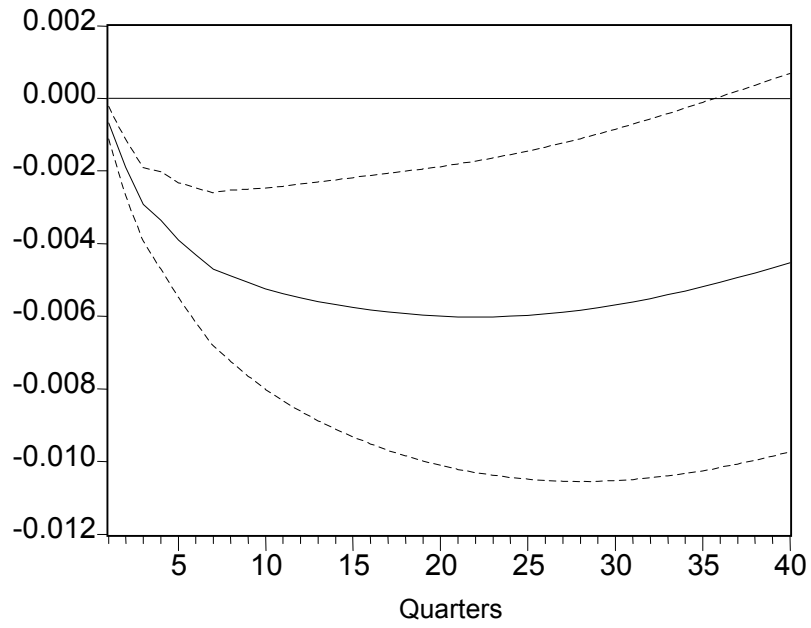
Figure 8a

Federal Deficit and Net Private Domestic Investment, 1959-2002
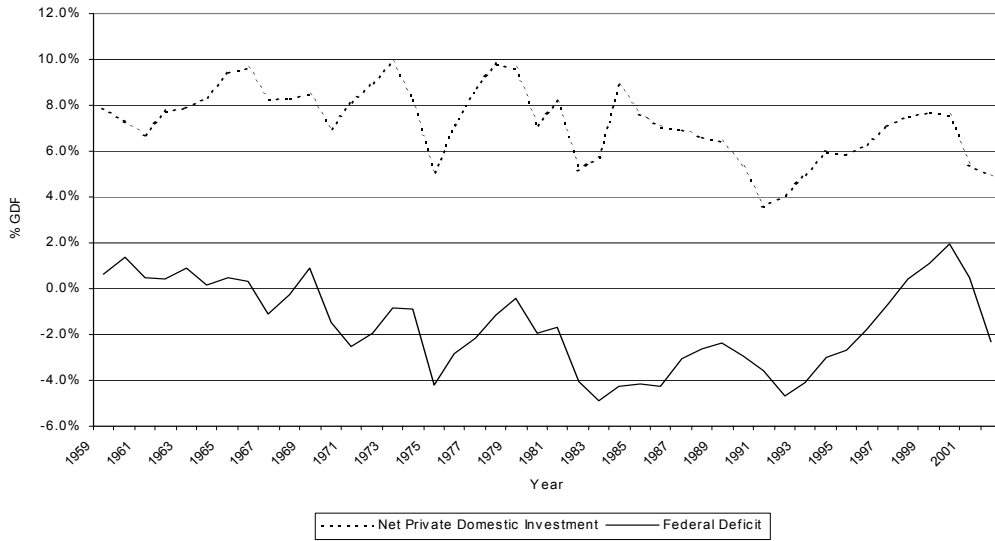
Figure 8b

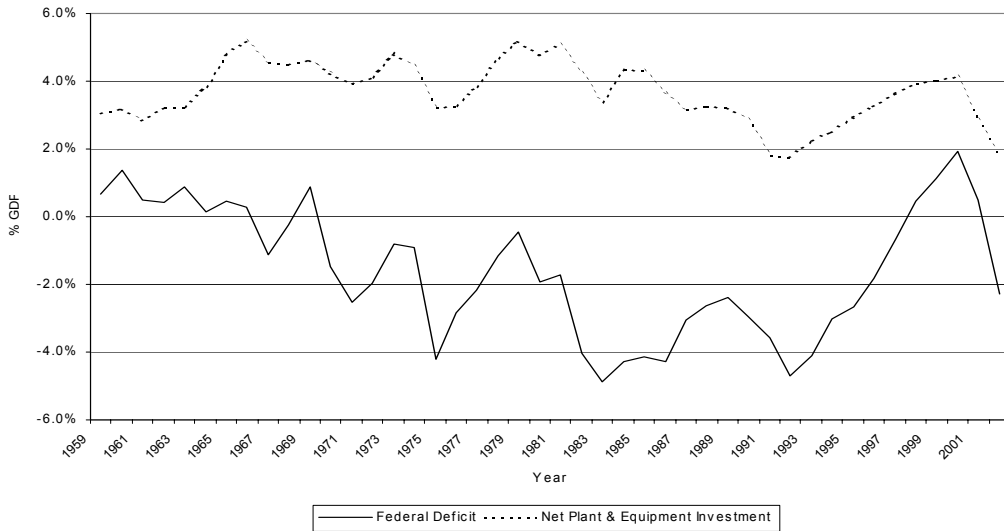**Federal Deficit and Net Plant & Equipment Investment, 1959-2002**

Figure 9

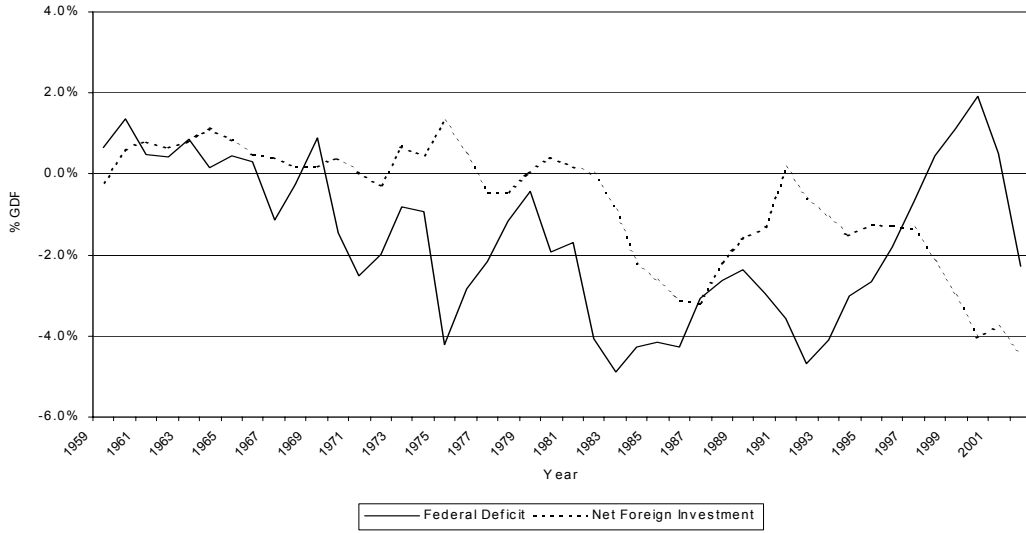**Federal Deficit and Net Foreign Investment, 1959-2002**

Figure 10a

**Response of Gross Private Domestic Investment to
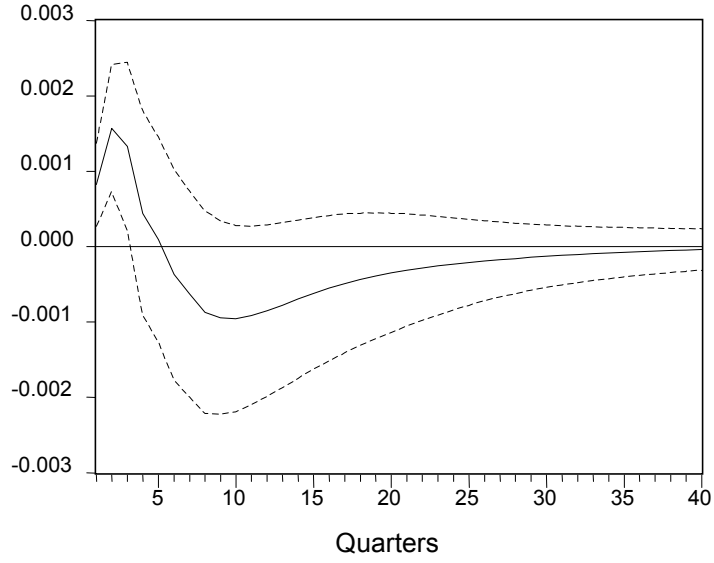Deficit Shock**

Figure 10b

**Response of Gross Plant & Equipment Investment to
Deficit Shock**