Which Deficit?
Comparing Thirteen Measures of the U.S. Fiscal Deficit
on Theoretical and Empirical Grounds

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Abstract:

I compare a variety of measures of government budget deficits theoretically and empirically. I make adjustments to the official, on-budget deficit estimate for off-budget items, state and local deficits or surpluses, deviations from high employment, price effects, and two types of capital accounting. Unlike previous analyses of these changes, I include adjustments to the state and local budgets for cyclical factors, using newly-available estimates, to estimate a total-government structural deficit (and variants thereof).

My analysis shows that, in theory, at most two deficit measures (price-adjusted high employment deficits and capitalized price-adjusted high employment deficits, both for the total government sector) are necessary and sufficient to assess the potential benefits and harms of fiscal deficits.

Empirically, however, I find that the theoretically-preferred deficit measures are often not more useful (and are, in some cases, less useful) than are some of the cruder deficit measures in providing significant statistical results for several basic macroeconomic relationships. Indeed, in spite of the important value (based on other criteria) more careful deficit accounting provides, some of the more crudely measured deficits are not demonstrably worse than more carefully measured ones in explaining inflation, unemployment, or real GDP growth. ***The two most commonly-quoted measures, however, are not only crude but also perform very poorly in econometric tests.***

While the federal-only "Price-Adjusted High Employment Deficit" (PAHEDF) is empirically dominant in more tests than any other measure, this dominance pertains in only about half of the tests, with the other half showing no clearly dominant measure, and the total-government version of this measure showing disappointing results. This is based on a battery of tests using ordinary least squares regressions, AR(1) corrections for serial correlation, instrumental variables analysis, vector autoregressions (VAR's) and impulse response functions (IRF's).

I. Introduction

Even before the political obsession with the U.S. federal budget deficit reached its current fevered pitch, many economists were aware of some rather dramatic shortcomings in the debt and deficit data, as compiled and published in federal budget documents and in the National Income and Product Accounts (NIPA). Led largely by Eisner and Pieper (their seminal work in this regard is [1984]), it is now generally agreed that the reported fiscal deficit is not merely inaccurate in the usual senses that data are open to question (incomplete samples, transcription errors, etc.), but it is fundamentally incorrect as a meaningful reflection of the economic activity of the United States government sector.

The recognition of this problem set off an effort to define an appropriate measure (or, perhaps, more than one appropriate measure> of the fiscal actions of a government over a given time period. Naturally, not everyone agrees about the appropriate changes, perhaps largely because the various proposals each have implications for policy which are or are not agreeable to a particular investigator. In the face of professional disagreement over the appropriate changes to be made, the tendency to "default" to using the traditional measures, while understandable, is indeed unfortunate. For, while each of the alternatives may be open to question and attack, it may not be too bold to suggest that virtually any of the alternatives would be qualitatively better than the measure currently used.

(Which measures are ***quantitatively*** more useful is, of course, the subject of the empirical work of this paper.)

This paper will test several of the proposed alternatives which have been proposed for measuring the deficit, as part of the larger effort to make it possible for the economics profession to converge on a consensus. This investigation, therefore, will attempt to begin to answer two related questions. First, what is the most useful measurement (or measurements) of the government sector's fiscal deficit in theory, from the standpoint of capturing both the potential benefits1 and the possible damage done to the economy by deficit spending? Second, does the theoretically-preferred deficit measure dominate other deficit measures empirically?

One key difference between this analysis and others is the inclusion of four measures of the "structural" deficit which include state and local governments together with the federal government in a total-government measure. This is based on estimates of structural deficits for the state and local sector by Kusko and Rubin [1993]. Including these measures allows me to assess the empirical significance of federal-only versus total-government deficit measures in time-series analyses.

The main empirical conclusion that I reach is that "better" deficit

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1 The temptation to heed Benjamin Franklin's dictum ("Neither a borrower nor a lender be.") when analyzing government borrowing causes many casual observers (and even some careful analysts) to condemn debt as if it were, in every case, immoral. The facts that virtually everyone who owns a house does so by going into debt, and that an increase in business debt is considered a positive leading economic indicator, however, shows that few people really believe that debt is *inherently* bad. However, it is often asserted to be so for governments.

measures do not necessarily improve the econometric results provided by cruder measures in some basic macroeconomic relationships. While it is true that Eisner and Pieper's suggested federal-only Price-Adjusted High-Employment Deficit is more statistically significant than other measures in a plurality of the tests performed, this plurality is not even a strict majority; and including the state and local sector in this definition of the deficit makes the statistical results much worse rather than better.

In several instances, in fact, the more-refined measures perform significantly worse than some of the cruder measures as independent variables in explaining key macroeconomic performance indicators. Further, the total-government measures generally perform worse than federal-only measures, no matter what level of sophistication one uses in defining the deficit.

This should not, however, be viewed as an argument against the usefulness of the search for a superior measure of the fiscal deficit. It merely means that the various improvements under investigation do not possess a desirable "extra" benefit; that is, if one had developed a measure of the deficit which arguably conveyed the government sector's fiscal situation better than do other measures, it would be advantageous if it also dominated all others in time-series studies. Where that extra benefit is lacking, however, the improvement is no less of an improvement. Specifically, if one is looking to the deficit as a way of knowing if the "budget is balanced," the empirical results below do not speak to the relative usefulness of the different measures. Since each measure gives a different estimate of the level of the current deficit, that central issue remains as crucial as ever.

It should be noted, moreover, that the two most commonly-quoted

measures of the deficit, technically known as the On-Budget Deficit and the Unified Federal Deficit, do not provide strong statistical results in any systematic way in the tests reported below. Thus, while one can argue about which should be the preferred measure, there is little doubt that the numbers over which members of Congress are currently obsessing are of very little value.

In the next (second) section of this paper, I will discuss both the (relatively) non-controversial corrections that must be made to the data to improve their use value and the more controversial alterations which have been proposed for the deficit accounts. I will build a menu of different deficit measures, starting from the most basic and adding various adjustments to create more sophisticated deficit measures. This will, by its nature, entail a useful review of the established theory in this area of macroeconomics. Section Three will review in detail the menu of potential benefits and harms of deficits as a vehicle to analyze the potential uses to which the various deficit measures can be put.

Section Four presents results of a set of time-series regressions, testing each of the possible definitions of the fiscal deficit in its explanatory power as an exogenous variable for each of a set of macroeconomic target variables. Finally, Section Five discusses some conclusions.

II. Adjustments to the Accounts

The ability of Congress to define what is and is not a deficit is somewhat like the ability of the fabled king who decreed that the value of π should be set at exactly three. What we insist on believing to be true and what is actually true are sometimes different, and the more we use

incorrect measures of deficits, the more obvious this becomes.

Table 1: Measures of the U.S. Fiscal Deficit

	Acronym	Full Name	Derivation
1.	OBD	On-Budget Nominal Federal Deficit	Budget basis accounting
2.	UDF	Unified Deficit-Federal	OBD plus off-budget deficit (surplus)
3.	UDT	Unified Deficit-Total Government	Federal plus State/Local deficit (surplus), NIPA basis accounting
4.	DDGDPF	Change in nominal Debt-to-nominal GDP ratio, federal government only	Negative of Government Net Financial Assets-Federal
5.	DDGDPT	Change in nominal Debt-to-nominal GDP ratio, including federal, state, and local governments	DDGDPF plus Negative of Government Net Financial Assets-State and Local
6.	HEDF	High Employment Nominal Deficit-Federal	Federal deficit, NIPA basis, estimated if unemployment were at the NAIRU rate
7.	HEDT	High Employment Nominal Deficit-Total Government	UDT, estimated if unemployment were at the NAIRU rate
8.	PAHEDF	Price Adjusted High Employment Deficit-Federal, Simple Method	HEDF adjusted for price effects on outstanding federal debt
9.	PAHEDT	Price Adjusted High Employment Deficit-Total Government	HEDT adjusted for price effects on outstanding government debt
10.	KPAHEDF	Capitalized Price Adjusted High Employment Deficit Federal	PAHEDF, reduced by net federal investments in: durables, structures, education, natural resources, and labor training and services
11.	KPAHEDT	Capitalized Price Adjusted High Employment Deficit Total Government	PAHEDT, reduced by net government investments in: durables, structures, education, natural resources, and labor training and services
12.	KLPAHEDF	Capitalized (with Liabilities) Price Adjusted High Employment Deficit-Federal	KPAHEDF plus unfunded liabilities of the Social Security OASDI trust fund (Open Group)
13.	KLPAHEDT	Capitalized (with Liabilities) Price Adjusted High Employment Deficit-Total Government	KPAHEDT plus unfunded liabilities of the Social Security OASDI trust fund (Open Group)

A. Basic Adjustments

Table 1 summarizes the thirteen alternative measures of the U.S. fiscal deficit to be compared in this analysis. While it is impossible to

imagine any proposed adjustment to the measurement of debt and deficits that is non-controversial, there are several adjustments to "the deficit" that are fairly commonly accepted, at least among economists.

As a starting point, the official On-Budget Deficit can be used as a standard of comparison. For the purposes of measuring the government's fiscal impact on an economy, however, the deficit should include both on-budget and off-budget items.[2] Since the off-budget accounts are currently running surpluses (due to the surpluses in the Social Security System), the total deficit is less than the on-budget deficit alone.3 In 1993, the On-Budget

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[2] Under federal law, any spending bill can specify spending and revenues as being on- or off-budget. There is no immutable general principle which applies to all off-budget items, since it is political agreement that creates the distinction. For example, the outlays for "Commerce and Housing Credit" were separated into on- and off-budget outlays beginning in 1989, for no apparent economic reason; but this accounts for a tiny fraction of off-budget spending. The vast majority of off-budget receipts and outlays are due to the Social Security system. In 1993, of the $295.4 billion in off-budget outlays, there were $3.3 billion in Commerce and Housing Credit outlays, $330.5 billion in off-budget Social Security outlays, negative $31.7 billion in off-budget net interest outlays, and negative $6.8 billion in off-budget Undistributed Offsetting Receipts. Similarly, all of the $355.2 billion in off-budget receipts were from Social Insurance Taxes and Contributions. (There were also $135.2 billion in on-budget social insurance taxes and contributions, however.) Currently, therefore, *more than* the entire off-budget surplus is due to the Social Security System.

[3] While this adjustment seems obvious enough from a theoretical standpoint, and was in fact instituted by the federal government some years ago in reporting deficits, it was a misunderstanding of this issue which (paradoxically) led to the defeat of the

Nominal Deficit (OBD, deficit measure #1 in Table 1) was $300.0 billion (or 4.8% of nominal GDP) while the off-budget surplus was $45.3 billion, for a Unified Deficit-Federal (UDF, deficit measure #2) of $254.7 billion (or 4.1% of nominal GDP).

In addition, state and local governments' accounts can be included in a Unified Deficit-Total Government (UDT, deficit measure #3, which includes both on-budget and off-budget federal items along with all state and local items). In 1993, UDT was $244.2 billion (or 3.9% of nominal GDP), although this is not directly comparable to UDF, since UDF is calculated using budget-basis accounting while UDT is reported on a NIPA accounting basis.4

Balanced Budget Amendment in February of 1995. Several Senators, based on their stated fear that "raiding" the Social Security surplus to finance current deficits is unfair to the young, wanted the amendment to require that the On-Budget deficit be balanced by 2002. This puts in perspective the dangers of considering any change non-controversial.

4 That is, subtracting UDF from UDT will not derive the state and local surplus or deficit, even though that method would work if both measures were on the same accounting basis. NIPA deficits differ from budget-based deficits in several key respects, most notably (in recent years) the exclusion from the NIPA calculations of outlays for deposit insurance, as well as smaller items like geographic differences (Puerto Rico and the US. Virgin Islands being excluded from the NIPA accounts, for example). See Congressional Budget Office [1994b].

For the purposes of the empirical relationships to be analyzed below, the NIPA basis is the more appropriate measure of economic activity [see Congressional Budget Office, 1994b, for an argument to this effect]; but OBD and UDF are included in these analyses due

There is a theoretical reason as well as a practical reason for including non-federal government accounts when measuring the deficit. The theoretical reason is that the effect of "the government" on an economy is not a function of the level of the government that makes the expenditure. A dollar spent is a dollar spent, and a dollar borrowed is a dollar borrowed, no matter which governmental unit spends or borrows it. The practical reason is that excluding state and local government finances from the deficit calculations has caused Congress and successive Presidents to shift financing responsibilities for various programs downward, meaning that "the government" is still doing what it was doing-but a different financial official is signing the check.[5] Perhaps because of this, the adjustment in 1993 for state and local deficits was minuscule: a $2.1 billion surplus in 1993, although it had been in surplus by as much as $58.1 billion in 1984.[6]

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to their more common usage and as a baseline against which to measure the more carefully estimated deficits.

[5] Actually, the practical impact of this has been to reduce total government spending without specifically voting for the cuts. Since states and localities are much more prone to losing their tax bases than is the federal government, they have not been able to raise the revenues necessary to fund both old and newly-imposed programs. The resulting cuts in non-federally-mandated programs might be an appealing result to some, but it is a surreptitious method of enacting budget cuts at best and unpredictable in its ultimate quantitative impact at worst. The recently enacted ban against "unfunded mandates," if it works in the way it sponsors intend, will limit this.

[6] The picture is also distorted by the substantial amount of grants-in-aid from the federal government to state and local governments, which amounted to $181

B. Changes in Debt as a Measure of Deficits

Conceptually, the deficit should equal the change in debt for the year; and deficit/GDP should equal Δdebt/GDP. Attempting to derive deficits in that way, however, highlights a problem that is not obvious in the deficit numbers alone. Specifically, there are a number of different series that could be called "the debt." The ***Economic Report of the President*** [Council of Economic Advisors, 19941 provides a large variety of series relevant to this issue: "Gross Federal Debt-Total" and "Gross Federal Debt-Held by the Public" (both in Table B-77), the amount of the gross federal debt held by the public that is actually held by the Federal Reserve (Table B-78), "Interest-Bearing Public Debt Securities"-both marketable and non-marketable (Table B-851, "Marketable Interest-Bearing Public Debt Securities Held by Private Investors" (Table B-861, "Public Debt Securities Held by Private Investors," and the state and local government ownership thereof (Table B-87). None of these series is equal to any of the others, and all are different from "Government Net Financial Assets" (Table B-112).

The difference between the Gross Federal Debt-Total and Gross Federal Debt-Held by the Public is the many securities held by federal agencies ($1.4 trillion of a total $4.3 trillion in 1993, for example). Since the amount of debt held among federal agencies is more an accounting convention than a measure of the drainage of funds from capital markets,

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billion in the 1993 fiscal year. This creates the potential for the federal government to "solve" a large percentage of its deficit problem by cutting off such funds to the states-a move which would create chaos, to be sure, but which is tempting if one is merely worried about the level of the federal deficit.

it would make sense to look at the publicly-held debt only. Much of this, however, is actually held by state and local governments (which are included among "private investors" in the data). Subtracting those from the debt, the remaining series would include only those securities held by the American public, U.S. corporations, and foreign entities.7

However, the exercise at hand is designed to test whether close substitutes to the Eisner and Pieper calculations can be found in changing debt-to-GDP ratios. Therefore, rather than creating an entirely new family of debt adjustments, and in order to be consistent with Eisner and Pieper's calculations of price effects (described below), the "Government Net Financial Assets" series are used to define deficit measures #4 and #5, which are the changes in the nominal debt-to-nominal GDP ratios for the federal debt only (DDGDPF, which was 2.1% in 1993) and for the total of both the federal and state/local sectors (DDGDPT; 2.6% in 1993).

C. High-Employment Adjustments

One of the most important adjustments to the deficit measures is the so-called structural (or cyclically-adjusted) deficit. This hypothetical measure of what the deficit would be if the economy were at full employment is, of course, tied to the debate over what is the level of full employment itself. Estimates of "full" employment range from as low as a

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7 Much of the federal debt is held by the Federal Reserve (almost precisely 10% of the Gross Federal Debt Held by the Public in 1993). However, corresponding to the debt held by the Fed are the monetary obligations of the Fed (the monetary base-Federal Reserve Notes plus banks' reserve balances with the Fed), which are assets of the public. If we are interested in the total ultimate claims of the public on the government, therefore, there is no need to adjust for the Federal Reserve's holdings of federal debt.

1.6% unemployment rate [Vickrey,1993] to 6.25% [Weiner, 19931, but the current practice is to use the NAIRU (Non-Accelerating Inflation Rate of Unemployment) level of unemployment as the benchmark for the structural deficit. The largest plurality for estimating the NAIRU seems to be between 5.7% and 6.0% [see Weiner, 19931, although the January 1994 change in the labor survey raised questions about that level.8 In any case, the Bureau of Economic Analysis finessed the question of whether this is "full employment" by calling their structural deficit a "high-employment" deficit, rather than a full employment deficit, and the Congressional Budget Office (CBO) calls their structural deficit series the "Standardized-Employment Deficit."

For time-series empirical work, however, this debate turns out not to be important. The variance of the structural deficit series is unaffected by the choice of a benchmark. One explanation of this [for example, Congressional Budget Office, 1994a] is that Okun's Law reliably captures the tradeoff between unemployment and GDP, and further that changes in GDP are linearly related to changes in revenues and expenditures. This means that the variation in the deficit does not change no matter which unemployment rate is used to define full employment. It should be noted, however, that this useful linearity is almost certain to break down at the more extreme estimates of full employment, for example, Vickrey's 1.6% target.

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8 The Congressional Budget Office [1994b] currently estimates that the new survey technique requires raising NAIRU estimates by roughly one-fourth of a percentage point above previous estimates, although they cite evidence that the necessary adjustment might be as low as 0.1%. In any case, their estimate of the NAIRU is now 6.0%.

The reason to look at the structural deficit, rather than the actual deficit, is obvious (at least to Keynesians): attempts to balance the actual budget are likely to be self-defeating. That is, attempts to cut government spending and increase net tax revenues will decrease GDP (by larger or smaller amounts, depending on the size of the multipliers), at least in the short run, which will raise government spending and lower net tax revenues, re-creating a deficit-albeit a smaller one than before. This circular process is convergent in most macroeconomic models, so that the actual deficit *can* be eliminated in this way, but only at the cost of a significantly deeper recession.

In this paper, the High-Employment Federal Nominal Deficit (HEDF, deficit measure #6), is taken from the CBO's standardized-employment deficit series [1994a], which uses a non-constant estimate of NAIRU (which has ranged between 5.0% and 6.0% over the thirty-seven years that it has been estimated, although it has not been below 5.5% since 1963). In 1993, HEDF was $215.0 billion, or 3.4% of nominal GDP. The Bureau of Economic Analysis's series[9] [de Leeuw and Holloway, 1983, and subsequent updates in the *Survey of Current Business],* which is based on a 6% definition of full employment,[10] is only available through 1990, because-in the most

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[9] Although the standardized-employment deficit and the high-employment deficit use different methodologies, they have moved very similarly over time. The correlation coefficient between the two over the 1956-1990 period was 0.993, while the correlation coefficient between annual changes in the two series was 0.939. Hence, for time series analysis, the substitutability between the series should be quite high.

[10] Actually, the derivation of this series is based on "mid-expansion trend" levels of GDP and revenues/expenditures, which happens to coincide with a 6%

beautiful of ironies-budget cutbacks have prevented the BEA from updating the series after the most recent change in the methodologies of the NIPA.

A structural deficit series has also been estimated for the state and local sector, by Kusko and Rubin [1993]. Their estimates are based on the unrevised methodology of the National Income and Product Accounts, but it at least provides an entry point for estimating the total government sector's potential deficit at NAIRU. For 1993, the state and local sector's structural deficit was estimated to be –$12.9 billion (i.e., a surplus) which, added to the HEDF of $215.0 billion, brings the total government structural deficit (HEDT, deficit measure #7) to $202.1 billion, or 3.2% of nominal GDP.

D. Price Adjustments

An important, and more controversial, series of adjustments attempts to account for the effect of inflation on the deficit and debt accounts [see, for example, Eisner, 1991a]. Since inflation (or, perhaps more accurately, expectations of inflation) is built into the interest rates that governments pay on their outstanding debts, it is arguably appropriate to decrease the measured deficit by the so-called "inflation tax," i.e., the amount that inflation has increased the debt. With a $4 trillion debt and 3% inflation, for example, governments have paid $120 billion to their lenders to prevent their principal from losing real value. This can be subtracted from the deficit as if it were tax revenue, since it represents the decrease in the real amount of debt owed by the government to its bond-holders.

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unemployment rate. It is not, therefore, a direct attempt to estimate the changes in the deficit due to changes in unemployment rates, but arrives at such conclusions indirectly.

Of course, a deficit is a flow of indebtedness incurred throughout the course of a year. Eisner and Pieper [1988 and 1991, for example] construct a method to account for this, and (with D equal to net federal debt at market value) use the following equation to compute Price Effects (PE), with the super-script "e" denoting end-of-period values:[11]

$$(1)\quad PE = \frac{(\frac{P^e_t}{P^e_{t-1}} - 1)D_{t-1} + (\frac{P^e_t}{P_t} - 1)(D_t - D_{t-1})}{\frac{P^e_t}{P_t}}$$

Looking at this piece-by-piece, it is actually two separate adjustments: the first adjusts previously accumulated debt for the percentage increase in prices from the end of the previous year to the end of the current year; and the second part adjusts this year's *increase* in debt (which is the deficit, assuming away all of the accounting differences) for the percentage change in prices from the middle of the year to the end of the year. Both parts are then divided by the simple ratio of the end-of-period price to the average price,[12] with the two results summed. The result is a dollar value which is then subtracted from the deficit to produce the Price Adjusted High Employment Deficit.

However, Eisner has recently been using a simpler method for measuring price effects [for example, 1994a, and Eisner and Pieper, 1992]. Multiplying net federal debt[13] by the percentage change in the implicit GDP

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11 The end-of-period price level is calculated as the average of the values of the fourth quarter implicit GDP deflator and the next year's first quarter deflator. In symbols, this becomes: $Pet = \frac{P_t(QIV) + P_{t+1}(QI)}{2}$, where Q stands for quarter.

12 This converts the sum into a real value based on the mid-year prices.

13 These analyses use Net Federal Debt at market value, a series of their own

deflator and subtracting this from HEDF gives us deficit measure #8, PAHEDF, which is the Price Adjusted High Employment Deficit-Federal Government, constructed using this "simple" method of price adjustment.[14] In 1993, PAHEDF was $144.4 billion, or 2.3% of nominal GDP. Using the same method (but using HEDT and net total government debt instead of HEDF and net federal debt) produces deficit measure #9, the Price Adjusted High Employment Deficit-Total Government (PAHEDT). In 1993, PAHEDT was $125.4 billion, or 2.0% of nominal GDP.

The difficulty encountered in making the price adjustments above raises the question of whether such work is actually necessary at all. After

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construction (from Flow of Funds data, with U.S. government retirement fund reserves excluded). As an approximation, Eisner suggests using the negative of "Government Net Financial Assets-Federal" from Table B-112 of the 1994 *Economic Report of the President*, which is measured at par value rather than market value.

[14] In practice, the difference between the complex method and the simple method of computing price effects was arguably small, only $6.1 billion (or 0.2% of GDP) in 1993, and never exceeding $7.6 billion. The difference did, however, go as high as 57% and as low as -62%, averaging 2% over the period 1963-93, leaving open the question of whether there is empirical significance in the difference between the two. However, correlations between the two raw series as well as between annual changes for the two series (similar to those reported in Tables 3 and 4 below) were 0.999 and 0.994, respectively. In none of the econometric tests performed for this analysis, moreover, was there more than the slightest difference between results for the complex series and the simple series. Therefore, only results for the simple series are reported. For the interested reader, full results are available from the author.

all, like any deficit, the best method for measuring PAHEDx is to express it as a percentage of nominal GDP, to account for the increasing ability of the economy to support government debt. (Why one should use nominal rather than real GDP is, alas, more complicated than might be imagined, as discussed below.)

Since the numerator of this deficit variable has been adjusted for price effects, should it not be possible to adjust the denominator for inflation by using real GDP, with the price adjustments simply canceling out? Certainly, this would be true if the nominal-to-real adjustment is accomplished simply by dividing the annual deficit by a price index. If that were all that was going on, a large amount of unnecessary effort would have been spent trying to account for inflation's effects on the deficit.

However, what is happening here is conceptually different. The price adjustment does not deflate the annual nominal deficit to real dollars. Instead, this involves a numerically larger reduction of the nominal deficit, in that we are subtracting from the (high-employment) deficit the effect of inflation on the entire accumulated debt. Specifically, the price-adjusted deficit equals the deficit minus the "inflation tax," which is "levied" against all outstanding debt, while the method suggested in the previous paragraph would merely subtract the inflation tax on one particular year's deficit—a stock/flow distinction of profound importance.

The resulting price-adjusted deficit is not yet, in fact, a "real" quantity. The appropriate denominator for expressing this deficit as a real value is (as noted above) nominal GDP, which allows the nominal deficit minus price effects to be expressed as a percentage of the nominal income. This allows the price level to cancel out of the ratio, giving a result which (assuming away the other complications already noted) corresponds

conceptually to a "change in the real indebtedness of the government."

Whether this conceptual difference matters empirically is, of course, another question; attempts to infer answers to that question are the subject of the empirical estimates reported below.

E. Capital Accounting

Most states in the United States, most industrialized countries, and virtually all large businesses around the world differ from the United States federal government in one key respect-they use Capital Accounting to separate consumption expenditures from investment expenditures. In the private sector, in fact, capital accounting is an essential element of "good accounting practices." For any corporation, the difference between an expenditure on a Christmas party and the purchase of new computer hardware is easily noted by counting the first as an operating expense and the second as a capital expense. Prudent fiscal management involves balancing the operating budget, but deliberately *not* balancing the capital budget. This carries over to the balanced-budget requirements imposed on a large majority of the state budgets in the U.S., because the requirements are imposed only on operating budgets. Since the U.S. federal government does not even keep a capital account, however, a balanced-budget requirement would have far different effects on the federal government than it has on state governments [cf. Eisner, 1993].

Having the federal government institute the use of capital accounts would, therefore, seem to be unarguably necessary. That it has not been done is, no doubt, due in large measure to inertia and other factors beyond the realm of economic analysis. However, one substantive economic concern weighing against federal adoption of capital accounts is that they might become an irresistible blank check for any spending program favored

by an influential lawmaker. The operative logic could well become: Call it investment, move it on to the capital account, borrow some money, and forget it. Some in the popular press have even gone so far as to label capital accounting a "magic trick" best avoided by fiscally responsible lawmakers [Pennar, 19931.

Before drawing this worst-case conclusion, however, it is worth considering the experiences of the thousands of organizations and governments already using capital accounting. There is apparently no systematic analysis to date concluding that capital accounting is generally abused where it is in use.[15],[16] Moreover, the existence of well-tested accounting standards from national regulatory and advisory bodies (most prominently, the Financial Accounting Standards Board) makes it at least possible that the federal government could be given an accounting system that would be relatively difficult to abuse.[17] Better that than to continue

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[15] An exception to this, ironically, is the case of state governments that must meet constitutional balanced-budget requirements. It is apparently frequently true that constitutional balanced-budget rules have caused state governments to engage in "creative" accounting. See, for example, a discussion of this by the former Comptroller of New York State [Regan, 19951.

[16] It is also true that there is no systematic analysis to date showing the absence of such abuse where capital accounts are used. While strict rules of argument might label such an effort unnecessary on the grounds that it is "proving a negative" (the burden of proof falling on the assertion that capital accounting might be abused), it would nevertheless be comforting to rely on more than debating tactics to advocate capital budgeting. Therefore, this will be the subject of further research.

[17] The Federal Accounting Standards Advisory Board is, in fact, constantly

using what is indisputably an incorrect method of accounting.

This error is carried over into the standard treatment of government spending in most professional treatments of fiscal issues. After separating private spending into consumption and investment (C + I), government spending is lumped into one variable (G). A more appropriate formulation would have aggregate expenditures defined as follows: E = Cp + Ip + C_G + I_G, where the subscripts P and G stand for private and government, respectively.[18] This would allow the consumption and investment accounts to be consolidated, and would make clear that if a one dollar decrease in private investment spending is replaced by a one dollar increase in government investment spending, that would not only have no effect on overall spending but also no net effect on national investment.

In constructing the federal capital account adjustments for the present purposes, four spending categories will be treated as public investment: non-defense durable goods, education, natural resources, and labor training and services. [Eisner, 1994a, uses a different set of expenditures, notably including research and development spending, which gives him nominal total gross federal capital expenditures in 1992 of $530 billion, as opposed to $113.6 billion by my much more restrictive methodology.]

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evaluating various accounting rules that might be used by a federal capital accounting system.

[18] This is already done in the United Nations' System of National Accounts. The U.S. Bureau of Economic Analysis will also soon begin reporting data using this method in the NIPA.

It is certainly true that many of the dollars spent under these categories are not actually investment spending (administrative expenses, for example); but it is also true that many of the dollars spent under other categories should be counted as investment spending (various aspects of transportation or criminal justice spending, for example). However, lacking true capital accounts with a more detailed breakdown within spending categories, this admittedly imperfect measure will have to suffice.

In addition to these four spending categories, the net change in government-owned capital goods, as provided by the Bureau of Economic Analysis [1994] is the fifth and final category of government investment spending. The total of these five categories provides an estimate of gross capital expenditures, from which depreciation is subtracted to define net capital expenditures. Depreciation is calculated, following Eisner's [1994a] treatment of intangible capital depreciation, to be two-thirds of gross capital expenditures.[19] Subtracting these spending categories from PAHEDF[20] results in KPAHEDF, the Capitalized Price-Adjusted High Employment Deficit for the Federal Government, deficit measure #10. In 1993, this showed a deficit of $36.6 billion, or 0.57% of nominal GDP. By a similar

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[19] The depreciation calculation is not necessary for the net change in government-owned capital goods, nor is it necessary for the durable goods series, since depreciation has already been netted out of the estimates.

[20] Since the investment spending of the government is, at least conceptually, not done in response to cyclical changes in the economy (or, at least, is not done automatically in response thereto), it is appropriate to combine the (hypothetical) high-employment deficit estimates directly with the (actual) capital account estimates without fear of incompatibility.

adjustment, subtracting total government capital expenditures from PAHEDT produces KPAHEDT (deficit measure #11), which showed a ***surplus*** of $15.2 billion in 1993, or 0.25% of nominal GDP.

This analysis of the capital account is, however, arguably incomplete. While the asset side of the capital account is considered in some detail, the only entry on the liability side is depreciation of government-owned capital. Every government, however, along with its investment activities (which will yield benefits in the future), sometimes engages in activities and makes decisions which must be paid for in the future. Governments commit themselves to pension guarantees, loan guarantees, and liabilities for future retirement benefits. When this is done on an unfunded basis, those future liabilities arguably constitute a necessary further adjustment to the deficit.

Indeed, it has been argued [for example, Kotlikoff 19921 that the entire budget deficit concept is tautological, since the measured deficits reflect only those activities which are defined as expenditures and taxation. Naturally, therefore, new definitions would result in new deficit measures-without changing any real activities of the government, or any real responses by economic actors. For example, relevant to the present issue, Auerbach [1994] points out that if the Social Security system were replaced with "...an actuarially fair public pension system investing in government debt plus an old age transfer program to the elderly. . . ," this change would immediately raise the national debt by the stock of outstanding unfunded liabilities of the social security system-without changing anything real.

Thus, the annual deficit could include annual changes in that part of the debt that reflects changes in unfunded liabilities. By far the largest of

these (in terms of either total assets or total liabilities) is the Social Security Old Age Survivors and Disability Trust Fund (OASDI), the assets and liabilities of which are estimated on an "open group" and "closed group" basis. Since the closed group includes only those persons currently within the Social Security System, while the open group includes all those (including those not yet born) estimated to be in the system within the next seventy-five years, the open group estimates provide a more appropriate theoretical foundation from which to estimate the unfunded liabilities of the system.

In 1993, the actuarial deficiency in the OASDI trust fund was $1,863.7 billion. Including these liabilities in the capitalized price-adjusted high-employment deficit[21] results in KLPAHEDx, the Capitalized (with Liabilities) Price-Adjusted High Employment Deficits for both the federal government and the total government sector.[22] In 1993, KLPAHEDF (deficit measure #12) was –$54.5 billion, or -0.88% of nominal GDP, while

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[21] Extending the analysis to all unfunded liabilities is not possible, because the basic concept of an unfunded liability is not well-defined *in the aggregate.* That is, some transfer payments are financed through general revenues, which are not earmarked in advance for a particular use. Thus, the. OASDI accounts provide a unique opportunity to analyze the obligations entered into by governments in advance, since they are legally identified and carefully tracked.

[22] There is, unfortunately, as yet no systematic set of estimates of totals for the states which would correspond to these estimates for the federal government. Therefore, for the estimates that follow, the federal unfunded portion of OASDI is added to KPAHEDF as well as KPAHEDT to provide estimates of a more complete capital account for both federal-only and total government measures of the fiscal deficit.

KLPAHEDT (deficit measure #13) was –$106.3 billion, or -1.70% of nominal GDP. (The negative signs, again, indicate a *surplus.)*

While the inclusion of unfunded liabilities resulted in surpluses in 1993, this is by no means the typical result. Indeed, the unfunded liabilities of the social security trust fund have varied widely (even wildly) over the twenty-plus years that they have been tracked. At their most extreme, they went from an annual surplus of $4.4 trillion in 1978 *(double* the nominal GDP) to a deficit of $3.3 trillion the following year, and back to a $2.8 trillion surplus in 1980. Their sheer magnitude dwarfs the other elements of the deficit accounts; and the magnitude of their changes completely dominates everything else in regression analyses. Thus, while empirical results for deficit measures #12 and #13 are reported below, they are probably meaningless, and they are certainly not comparable to the other results.

Indeed, as noted in Section III below, the four deficit measures which correct for the capital accounts are not theoretically designed to measure the same things as are the other measures of the deficit. Although the non-capitalized deficits differ from one another in other respects, they have a common feature: each in its own way is designed to measure the stimulus to aggregate demand caused by federal spending on goods and services. The current/capital distinction is not important in that regard. KPAHEDx and KLPAHEDx, on the other hand, tell how much of the borrowing for such spending was done for current, operating expenditures. The applicability of the various deficit measures to different macroeconomic questions is, therefore, a key issue. This is addressed in the next section.

III. Different Deficits for Different Questions?

It is obvious from the above discussion that there is no a priori single, right measure of the deficit. The benefits and costs attributed to the deficit are varied, and various measures of the deficit might be necessary to consider them. The analysis following, indeed, indicates that this possibility turns out to be true-that two measures of the deficit (PAHEDT and either KPAHEDT or KLPAHEDT) are theoretically necessary to assess fully the macroeconomic impact of fiscal policy. Moreover, several of the purported harms of deficits simply cannot happen-no matter which measure of the deficit one uses. The potential benefits are considered presently, with the potential harms detailed thereafter.

For the analysis which follows, it is useful to cast the discussion within the familiar aggregate demand/aggregate supply model of the macroeconomy, based on the neo-classical/Keynesian synthesis. While many variations and alternatives to this model exist, this simple approach (adjusted to use flow values of prices and output rather than stock values) will provide a framework sufficient to analyze the relevant arguments.23

To summarize explicitly the basics of the model (which can be found in most undergraduate textbooks, for example Dornbusch and Fischer [1992]): real GDP growth is on the horizontal axis; inflation is on the

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23 Given this approach, the present analysis will not consider so-called "equivalence" effects (based on Barro 119741) of changes in government borrowing. Were the equivalence concept to be taken seriously in its most extreme form, of course, it would make the entire discussion irrelevant. It is possible, however, to argue that there are equivalence-like tendencies that need to be considered. See Seater [1985], for example, for a discussion of why these issues might be important.

vertical axis; a perfectly vertical long-run aggregate supply curve rests at the level of real GDP growth achieved when unemployment is at NAIRU; there is a downward-sloping aggregate demand curve that moves right (left) due to expansionary (contractionary) fiscal and monetary policies; and there is a short-run aggregate supply curve that is flat at extremely low levels of output and becomes nearly vertical to the right of the long run aggregate supply curve. In addition, expectations of inflation always adjust over time to move the economy to long run equilibrium at the NAIRU rate of GDP growth.

A. How Deficits Can be Good

In this context, the most obvious benefit of increases in deficit spending is faster growth of real output. Higher deficits shift the aggregate demand curve to the right, and the movement along the short-run aggregate supply curve produces higher growth of real GDP (as well as higher inflation). If the economy starts below NAIRU output growth, this ends a recession without further inflation; but if it starts at or above NAIRU growth, the long run result will be a higher inflation rate without permanently higher GDP growth. Thus, the benefit of higher deficits is always more output in the short run, with the benefit persisting into the long run if the deficit is a counter-cyclical measure. This relationship (between higher deficits and higher GDP growth) will be tested in the empirical analysis to follow, in separate equations with other potential causes of aggregate demand shifts (changes in the monetary base and changes in real exchange rates, which would change net exports with a lag) as additional explanatory variables.

Typically, a fall in the unemployment rate is associated with higher GDP growth. Higher output growth is associated with higher labor

demand, and thus unemployment falls as output growth rises. The persistence of this, again, depends on whether the unemployment rate falls below NAIRU. If so, the long run adjustment process will move the labor market back to equilibrium at NAIRU, by assumption. This relationship (between higher deficits and decreases in unemployment) will also be tested in the empirical analysis to follow, again with real exchange rates as an additional explanatory variable.

A third benefit of deficit spending (that is not immediately obvious in the main graph of this model) is potential "crowding-in" of private investment. [See B. Friedman, 1978.1 Usually assumed to be operative only below full employment output growth, this idea states that private firms will tend to respond to evidence of stronger demand for their products by increasing their spending on capital goods. This, in turn, creates a further boost to GDP. When the economy reaches-or nears-capacity, the effect discontinues, as firms see that it is fruitless to buy new capital when there are no workers available to hire to use that capital. While this effect will not be estimated explicitly in the empirical work below, it is possible (given the reduced-form nature of the equations tested) that the relationship between GDP growth and budget deficits will partially reflect a crowding-in effect.

These three potential benefits are most likely to be associated with the non-capitalized measures of the fiscal deficit. That is, they are generally not dependent on the composition of the spending or taxing that goes into the change in the deficit, but are simply responses to surges in aggregate spending. Among the nine non-capitalized measures described above, the one that should correspond most closely to the deficit envisioned in the aggregate supply/aggregate demand model is PAHEDT, since it eliminates price effects, includes the entire government sector, and is not affected by

the level of real GDP growth.

A fourth benefit of deficit spending occurs only when the increase in the deficit is caused by higher public capital spending. This public investment should cause the economy to grow faster in the long run and, moreover, potentially support even higher levels of private investment. On the latter point, Erenburg [1994] finds that higher levels of public investment lead to higher levels of private investment, presumably because public investment often takes the form of the infrastructure needed as a platform for private growth. The best measure of this benefit would be, of course, the difference between PAHEDT and either KPAHEDT or KLPAHEDT (depending on one's view of the appropriate capital accounting procedure). That is, balance in KPAHEDT or KLPAHEDT coincident with a PAHEDT deficit would indicate that some governmental units have undertaken public investment.

B. How Deficits Can be Bad

The down side of deficits is a matter of extensive public discussion. Blinder [1991] boils the possible harms down to a list of six: national bankruptcy, inflation, crowding out of investment, crowding out of net exports, directly billing future generations for current consumption,24 and political gridlock. The first is definitionally impossible (as long as debt is

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24 This is the naive argument that it is possible to have current IOU's paid by future generations, as opposed to the two crowding out arguments, which argue that future generations are made to indirectly "pay" for current generations' profligacy by inheriting a smaller economy (or capital stock) than they would have. The crowding out arguments are potentially true, pending empirical verification or falsification; but the naive argument is, as argued below and in Blinder 119911, logically false in a closed economy.

denominated in nominal amounts of the home currency) and the last is not actually an issue of the level of the deficit and is thus outside the ken of the current study.[25] Each of the remaining four potential harms will be considered presently.

Inflation

That inflation is an inevitable result of deficit spending is, to many politicians (and apparently all bond traders), axiomatic. Either through a Phillips Curve relationship, in which the deficit lowers unemployment and concurrently raises inflation, or a Quantity Theory argument, the idea that a higher deficit leads to higher prices simply *must* be true.

In the Phillips Curve case (the mechanics of which were alluded to

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[25] The oft-repeated argument here is that we must reduce the deficit (even if there were nothing actually bad about deficits) because everyone thinks deficits are bad; and therefore, if we do not, we will continue to argue about not reducing it rather than dealing with our real problems. Legal scholars refer to this type of argument as the "heckler's veto," in which a person is prevented from exercising their rights, usually free speech rights, because of the threat that a potential listener might get angry at what is said and hurt someone or create some other problem.

In the context of the deficit, what we are saying is that we should do something which is at best pointless and at worst economically harmful, because a lot of people think we should. It is amazing that we are willing to engage in such double-think, rather than redirect our efforts to educating ourselves to the real costs and benefits of public borrowing. If the arguments against deficits [see, for example, B. Friedman, 1988, 19911 are correct, then they should stand on their own. Doing something wrong in order to do something right, however-especially since no serious attempt has been made to see if we could educate ourselves -is to submit to sophistry.

in the discussion of the aggregate supply/aggregate demand model above), what matters is the fiscal impulse (from all levels of government): so the deficit measure appropriate to analyze the likelihood of inflation is again PAHEDT.

If it is true, however, that correctly-measured deficits rose in the 1980's, this theory has some heavy empirical lifting to do to explain away the disinflation of that decade. Moreover, for the entire sample period, the empirical results below indicate that higher deficits are-if anything— associated with ***lower*** inflation, a strongly counter-intuitive result.

Perhaps one reason for this is that the Phillips Curve is not as simple as it might seem-a monotonically negative relationship between inflation and unemployment. The shape of the short-run aggregate supply curve determines the shape of the Phillips Curve; so an essential question, in a Phillips Curve defined around a NAIRU relationship, is whether there are any ranges of the short-run aggregate supply curve that are flat. If so, then there are situations where it is possible to raise deficit spending without raising inflation at all, successfully lowering unemployment at no "cost" (i.e., no increase in inflation).

Further, even if the short-run relationship is negatively sloped, it is still possible that the current unemployment rate is above NAIRU. If that is the case, then it is possible to choose to move to a lower unemployment rate and pay for the move with a permanently higher (but non-accelerating) rate of inflation. Only if deficit spending pushed the unemployment rate below NAIRU would the rate of inflation accelerate; and that would be due to the presumably inevitable re-adjustment to long-run equilibrium at NAIRU. Therefore, simple correlations between deficits and inflation will tell us little without conditioning the test for the level of unemployment,

which is what the tests below are designed to do. That the results are still not indicative of a positive deficit/inflation relationship is, therefore, even more problematic for those who argue that inflation is inevitably associated with deficit spending.

If, however, it is a quantity theory story of inflation that is being told, the driving force is not the deficit at all but the change in the money supply. The decrease in inflation during the debt run-up in the 1980's does less damage to this story than to the Phillips Curve story, because, as Blinder [1991] notes, only about ten percent of the increase in debt in the eighties was monetized. Since there is no apparent mechanical or theoretical connection between deficits and their percentage of monetization, however, this argument would seem to be entirely irrelevant to the deficit debate, and thus would have no associated deficit measure. As McCallum [1990, p. 966] notes, in a model with a Quantity Theory relationship: "...Unless tax and spending patterns are such as to generate an unsustainable path... different fiscal rules will imply different ongoing inflation rates... only if they result in different money stock growth rates."

The possibility of the fiscal authorities following such an "unsustainable path," however, deserves serious consideration. Since there is some outer limit to the amount of lending available to even the U.S. Federal government, the question is: How long can the fiscal authority run deficits while the monetary authority avoids monetizing those deficits?

The seminal theoretical essay in this regard is Sargent and Wallace [1981], who show that[26] the problem can be analyzed as a game between the

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[26] For copious references to this strand of literature, and for a good (and characteristically lucid) discussion of the issues involved, see McCallum [1990].

monetary and fiscal authorities. The relevant case for the present analysis is the game in which the fiscal authority is allowed to move first, setting its path of future deficits, followed by the monetary authority, which must accommodate the deficits (and, hence, create inflation) if the public is unwilling to demand the bonds offered by the fiscal authority. This unwillingness will, in fact, materialize whenever the demand for bonds implies an interest rate on bonds greater than the growth rate of the economy, since a path of unending deficits without monetary accommodation would violate a transversality condition.

On the empirical side, a survey by Seater [1985] concludes that there are very few empirical tests that demonstrate a connection between deficits and monetization or inflation, while there are many studies which show no such connection. In fact, Seater claims that the major study which does find a connection between government debt and interest rates [Feldstein, 1981], has "... results which arise from data errors and improper handling of simultaneity problems. Correction of these yields results supporting full tax discounting [i.e., Ricardian Equivalence]."[27]

The real issue, therefore, is whether the United States is, or has been, anywhere close to the point where the monetary authority would have been forced to monetize any further government borrowing. If we were to reach that point, then the Quantity Theory would become relevant to the

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27 One should, indeed, take note that Seater's survey is extremely sympathetic to the so-called Ricardian Equivalence hypothesis (although he does offer a disclaimer at one point to the effect that he is deliberately over-stating the case for the hypothesis). Those who are less enamored of that hypothesis are likely to find his reading of the evidence as to the neutrality of fiscal deficits less persuasive as well.

deficit debates. To this point, however, it seems that we have not.

Investment

The most theoretically and empirically promising argument against deficits is, of course, crowding out of private investment. Taking the form of the familiar re-writing of the leakages-equals-injections equilibrium condition[28], total household savings (S) are divided between private investment (I), total government borrowing (G-T), and net borrowing/lending by foreigners to finance a domestic trade surplus/deficit (Ex-Im).

Since this formulation lacks a processual explanation of cause and effect, however, the crowding out argument is often made in an alternative form: the crowding out of private investment is said to occur through financial channels, with higher fiscal deficits leading to higher real interest rates (assuming that the country's capital markets are at least partially closed to international capital flows-i.e., our new bonds are not all sold to foreign investors-which would otherwise prevent the domestic interest rate from deviating from the world rate), which cause (presumably interest-sensitive) investment expenditures to fall. (This latter explanation is embedded in the slopes of the aggregate demand and short run aggregate supply curves, in that they lower the potency of any multipliers due to

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[28] It is well understood that the ***measured*** quantities of leakages and injections are not the same as the ***equilibrium*** quantities of leakages and injections. However, the accounting identities are generally taken to be acceptable proxies for the values at equilibrium, and that simplification will be carried forward here. However, it should be understood that unintentional inventory adjustments and related issues are theoretically important; their empirical importance is a matter for potential further study.

crowding out.)

All of which is familiar; however, the very familiarity of these arguments belies a bewildering array of questions about the deficit measures appropriate to them. The first issue is the inclusiveness of the NIPA's definition of investment, i.e., the official investment figures include residential construction and inventory adjustments along with plant and equipment expenditures. However, if the crowding out argument is applied to either of the two former variables (and there is, of course, plentiful evidence that housing responds very strongly to changes in interest rates; and inventory theory is a separate study in itself), the argument is much less compelling.

It is one thing to suggest that productive business investments in plant and equipment are being prevented by government profligacy; this is clearly a case of pointless consumption replacing useful investment. On the other hand, if the argument is that government borrowing is crowding out some inventories, the moral certitude that this is always bad is somewhat lacking. Moreover, even if the other argument is made that housing is not being built because of government borrowing, this is not quite as obviously bad as it might seem, given that the housing thus crowded out is heavily subsidized by the tax code, and given that it includes luxury homes which are not primary residences. This is not to say that replacing inventories and housing with government purchases is never bad; but it is suggesting that the crux of the crowding out issue should be business plant and equipment spending, since it seems a *priori* clear (even for those who are not aficionados of growth theory) that that type of

investment ought not to be artificially reduced.29

The appropriate measure of the deficit to capture the amount of crowding out is, again, PAHEDT. Every dollar of spending by a government (by assumption, always bad) is a dollar that is not available for private investment (by assumption, always good[30]). If the economy is below full employment, increases in OBD, UDF, or UDT could simply be caused by the weak economy, while HEDx is affected by swings in inflation; and since the crowding-in argument above notes that government purchases can ***raise*** investment , every dollar of deficit spending below full employment would be enhancing rather than detracting from investment.

A more sophisticated treatment of government spending (as noted above), in which both private and government spending are separated into consumption and investment, will require a government capital account to

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29 Whether it ought to be artificially ***induced*** is another question. Eisner and Pieper [1992] suggest that it is at least not obvious that more investment is always better than less, since there must be some level of consumption below which we might not want to fall; and serious analysis of the marginal equality between the benefits of more investment versus more consumption is conspicuously lacking in most pro-investment policy proposals.

30 This is another area where the standard assumptions could benefit from more careful analysis. Given the prominent examples of private investment spending that is not productive (particularly unused commercial real estate properties), it is evident that thoughtful analysis of the social value of spending needs to be applied to private as well as public spending. The role of tax incentives in these episodes of private waste has received much scrutiny; but the question of whether a given project's real returns match its real financing rate of interest has been less explored.

reflect the possibility that some government spending is productive. This would at least introduce the possibility that all government spending is not thrown into a black hole, never to provide a positive social return. What is being crowded out-by what-would be more important than the mere fact of crowding out itself. More will be said about this subject below.

Empirical tests (using U.S. data) of the claim that higher deficit spending leads to lower growth (presumably due to the reduction in national savings and, thus, crowding out of productive private investment) have been, at best, contradictory [Eisner, 1994c, concludes that price-adjusted, high-employment deficits *increase* national saving, while B. Friedman, 1988 and 1991, argues the opposite].

For international comparisons, the most recent is Fischer [1993], who finds that, for a sample of ninety-four countries from 1962 through 1988, while a majority of countries that had high deficits also had low growth, there were some countries (for example, Italy and Morocco in different time periods) that continuously ran deficits of ten percent or more and still grew at rates similar to non-deficit countries[31]. For these and other countries, however, the high deficits coexisted with high savings rates and financial repression. This indicates that, while high fiscal deficits are not sufficient to decimate a country's growth, the relevance of their experience to the U.S. situation is suspect.

Consumption

Higher real interest rates, which might be the result of higher

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[31] Significantly, and relevant to the previous discussion regarding whether budget deficits cause inflation, Fischer treats inflation and budget deficits as separate, *independent* variables that might affect a country's growth rate.

deficits, might also decrease consumption spending, through either wealth effects[32] or durable goods effects. Even if this effect turned out to be true, however, this is not in the same category of arguments against deficit spending as crowding out of private investment. The fundamental and legitimate concern about reducing private investment is that we are reducing the growth of productive capacity in the economy, and therefore the size of the economy that we are passing on to future generations. This logic might also be extended, with qualifications, to consumer durables. However, the crowding out of current private non-durables consumption creates no such burden.33 Rather, it is merely-at worst, if the government spending is purely for consumption-the substitution of one type of

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32 While the major models (esp. MPS) show strong wealth effects on consumption, it is worth pondering whether such an effect is conceptually reasonable. For, if greater portfolio wealth is really affecting the consumption patterns of households, it must be doing so through the households that have both significant portfolios and are currently consumption-constrained. This upper-middle-class group (who account for about 10% of total consumption spending), therefore, would have to be altering their consumption patterns enough to explain 100% of the variation due to interest rate effects. While a statistical wealth effect is quite visible, therefore, it is still a puzzle as to whether this result is actually due to the reasons usually proposed.

33 It could still be argued that the crowding-in effect (of private investment responding to increases in aggregate demand) is somehow more potent when responding to demand surges led by private spending than when it is caused by government spending. If so, even less than a one-for-one crowding out of consumption by deficits could lead to more than one-for-one indirect crowding out of investment. However, there is no a priori reasoning which makes this argument persuasive in the absence of empirical suggestion.

consumption for another, with no future macroeconomic impact.

For this argument to fit into the leakages-equals-injections framework, moreover, ***ceteris paribus*** reasoning requires that we assume that both private investment and net exports are constant. This, however, would mean that the increase in deficit spending (which, in the United States in the 1980's, was largely caused by tax cuts rather than spending increases) is matched by an increase in savings, a result not observed by any stretch of the imagination (in the standard measures of savings[34]) during the run-up in nominal debt since 1980. Private savings as a percentage of GDP has generally fallen in that time, although not monotonically-which is, in fact, the basis of much of the economics profession's concern about the macroeconomic context in which deficits have risen.35

It is still possible to argue from, for example, a libertarian perspective that such consumption substitution is still a genuinely bad thing because it prevents private decision-makers from maximizing their consumption bundles at the equilibrium interest rate. However, much of the concern about government spending and deficits, especially at the federal level, is based on the assertion that the political system is biased toward deficits precisely because voters are unwilling to give up the

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34 Eisner's [1994c] method of calculating national savings finds otherwise, however, as noted above.

35 Obviously, in the 1980's ceteris were not ***paribus.*** However, this large a divergence of reality from theory (savings rates falling substantially rather than rising, in response to tax cuts and rising real interest rates) is at least suggestive that the model would need a lot of recalibration to be saved.

consumption that the government is shifting their way. If it really is a question of consumption-for-consumption crowding out, the argument is at least open. In any case, it would no longer be a macroeconomic debate.

Net Exports

The remaining item in the leakages-equals-injections crowding out story is net exports. When deficit spending rises, if savings remains constant or falls, and if private investment is not crowded out, the only remaining place from which to draw funds is abroad-either by lending out less (net) or borrowing more. This is of special interest because it is at least arguably what actually happened (rather than crowding out of private investment) as a result of the U.S. experience in the nineteen eighties [Blinder, 1991].

Once again, the sequence of events can be told through financial channels. If the higher deficit spending leads to higher relative real interest rates, this will raise the value of the dollar as investors shift into dollar-denominated financial assets (most obviously, the Treasury securities that are being issued to finance the debt). The higher dollar value then leads to falling net exports. The unprecedented drop in U.S. net exports in the eighties, as well as the record highs reached by the dollar in the middle of the decade, seem to support this scenario; but the rise in the trade deficit was largely due to the coincidence of rising imports and stagnant exports. Since the rise in imports is explainable by simply pointing out that rising incomes lead to rising purchases of everything (including imports), this is not necessarily a crowding out effect that we have observed. It could simply be a failure of foreign demand for our goods to keep up with our demand for foreign goods. Moreover, the volatility in the value of the dollar, without co-movements in net exports, makes these

conclusions somewhat difficult-but certainly not impossible (for example, so-called J-curve effects)-to defend.

For the purposes of public policy, however, the issue goes beyond whether crowding out occurs. Exactly the same questions raised under crowding out of private investment arise here. Since the interest paid to foreigners represents lost resources to society, just as the interest paid on domestically-held bonds represents lost real growth due to private domestic investment, the purpose of the borrowing becomes the key issue. If the borrowing is used to finance consumption, this is a net loss. However, if the borrowing is used to finance investment (for example, the foreign borrowing by the U.S. in the late nineteenth century that financed industrial expansion), then relative rates of return become the key issue, and KPAHEDT or KLPAHEDT becomes the important deficit variable. The crowding out of net exports argument becomes, therefore, analytically indistinguishable from crowding out of private investment.

Billing Our Grandchildren

The inter-generational shift question is one of the most commonly-repeated among all deficit arguments. Unlike the logically plausible crowding out arguments, which state that future generations will be ***worse off*** than they otherwise would be because of inappropriate current levels of consumption, this argument states that future generations are being directly billed for current consumption. Supposedly, "we" have been having a party, borrowing money, and passing on the bills-the increased outstanding federal debt, both principal and interest-to be paid by future generations. Even making the untenable assumption that the debt will ever be actually paid off, this argument is completely incorrect for a closed economy. The deficit is used to shift resources from one use today to a

different use today, while the repayment involves shifting resources from then-living taxpayers to then-living bond-holders. There is no net financial liability passed on from one generation to the next.

Of course, this can have enormously important intra-social effects on the distribution of wealth, and (as noted above) the shift of resources today from one use to another can certainly have deleterious effects on the size of the economy to be inherited by later generations (if the shift is from some type of investment to some type of consumption-or even to some type of investment with a lower rate of return than the investment from which spending was shifted) but it is not a matter of having a, future generation of Americans pay the bills of the present generation. We are borrowing from ourselves, and they will be paying themselves, and thus this is not a burden on the economy as *a whole.*

Given that the debt is one-eighth held by foreign entities, however, the picture is slightly different. The annual "deficit" relevant in this case is the change in the holding by foreigners of the domestic governments' debt.36 Even here, however, the question is whether the increase in foreign-held

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36 This will still miss indirect effects of government deficits. If such deficit spending leads to greater foreign purchases of private domestic assets, then future generations are losing more than the claims represented by foreign-held government debt. This is the basis of much of the concern with the change in the status of the U.S. to "net debtor" at the beginning of the 1980's—although many have argued [for example, Eisner, 1994b] that this entire issue has been misanalyzed and mismeasured. While this issue is important, therefore, including this effect in any official deficit measure is conceptually difficult to conceive and, in practice, daunting to undertake. It is certainly beyond the scope of the current inquiry.

debt is justified as an investment expense for the domestic economy. The argument then reverts to that noted under crowding out of net exports (which, in turn, reverted to the argument under crowding out of private investment).

The arguments both for and against deficits seem to range across a broad spectrum of macroeconomic issues. In fact, however, they all come down to one basic question: is the spending by domestic governments preventing something better from being purchased by private agents? If the economy is not at full employment, this question is almost certainly answered in the negative. If the spending is financed by central bank purchases of government debt, a separate set of monetary theory issues are raised. In the end, however, the most sustainable arguments against deficit spending are crowding out arguments, which must be supported on the theoretical level by cyclical adjustment and careful capital accounting of measured deficits.

Therefore, while it seemed originally that there might be several "right" ways to measure the deficit, in fact only one-PAHEDT-is sufficient in determining the size of an aggregate demand surge, and thus in determining whether the benefits and the costs of deficit spending accrue. Once the benefits and costs have been measured, it is then necessary to use KPAHEDT or KLPAHEDT to determine whether any net harms have occurred. Whether these measures provide useful and compelling empirical results is the subject of section IV.

C. Public Investment and the Debt-to-GDP Ratio

The implication from the forgoing is that simply knowing that the operating budget (KPAHEDT or KLPAHEDT) is in balance is enough to

resolve the issue of crowding out. This is not the case. The mere fact that a project has a positive rate of return (and thus is entered on the capital account) does not say that it is worth pursuing over another (private) project, which also has a positive rate of return. In a very perfect world, there would be an account which not only separated government investment from government consumption, but which identified the rate of return of government investment spending. If there were then an equivalent identification of the rate of return of private investment expenditures, one could compare the two to decide which is more socially beneficial. Even in this information-heavy world, however, the picture is a bit too simple-assuming as it does that there is a single rate of return for government investments and another for private investments. Since different spending projects, within the universes of available private and public investments, have varying rates of return, what matters is the rates of return of the *marginal* private and public projects which might or might not be undertaken.

While this familiar distinction might seem to require data far beyond the information available to policy-makers, the financial crowding out story provides a method of gathering a major part of the necessary information. The neo-classical model of interest rates says that the equilibrium interest rate reflects the value of the marginal investment project, since a rational investor would borrow money at any interest rate at or below the rate of return of a potential investment project.[37] Therefore, if government

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[37] This line of argument would also, of course, say that the equilibrium quantity of investment projects is effkient. Whether this is an accurate depiction of the way that interest rates are determined is, of course, controversial. It might well be that the

borrowing pushes up the real interest rate, and if that does lower private investment, the projects that were crowded out would be not only the lowest-valued but would have rates of return that are known to be below the new equilibrium interest rate. Significantly, then, market interest rates (with appropriate tax adjustments) would provide the rate of return for the *marginal* private investment project.

This analysis, however, is only true if we assume away risk (and, in particular, risk aversion). Many firms seem to calculate what are known as "hurdle rates of return" for their investment decisions, which have been estimated by surveys to be significantly higher than the market interest rate [Poterba and Summers, 19921. This implies that firms are very unwilling to invest in projects that have even a modest likelihood of failing to cover costs (and/or that different firms are responsive to different segments of the term structure). Therefore, for real-world comparisons, several important adjustments would have to be made to determine, from the observable market interest rates, the rate of return of the marginally crowded out private investment projects.

The second piece of necessary information, the rate of return of the governments' marginal investment project, might be available ex post *facto* from an indirect source. It can be argued that, under certain conditions

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Federal Reserve's policies have far more influence on interest rates than do changes in investment demand or in the supply of savings. However, this critical line of reasoning leads even further away from the notion that crowding out is necessarily bad, in that it explicitly abandons the notion that the otherwise-efficient decisions of private agents are being frustrated by government spending policies.

noted below, if the debt-to-GDP ratio is falling,[38] this is proof that the country's governments have been investing in projects that have a greater rate of return than the interest rate at which they borrowed money.

To understand this, imagine that we were in the position where the government sector's fiscal operating account were in perpetual balance, so that borrowing served only to finance public capital expenditures. In that case, a rise in GDP at a rate faster than the debt is accumulating interest should indicate that the country's governments are doing something "right." Extending this logic, Eatwell [1994, p.123] says: "So long as the social rate of return on public investment is higher than the net cost ... of any borrowing used to finance it, then the ratio of debt to national income will not rise."

As intuitively obvious as this might be, it turns out not to be true. A falling debt-to-GDP ratio (in the context of a balanced operating budget) is a sufficient ***but not necessary*** condition to demonstrate that the governments' spending projects are producing an acceptable rate of return. Specifically, while it is true that a falling debt-to-GDP ratio would be good news in this regard, it is not true that a rising debt-to-GDP ratio is always bad news. The public sector can invest in projects with very good rates of return, yet the debt-to-GDP ratio might still rise.

As a suggestive example, consider a scenario with very generous assumptions about the rate of return on public investment. Specifically, assume that, starting in year 1, the government sector finances $100 billion

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38 This is closely related to the concept of "viability," which says that the rate of growth of the basic budget (which excludes interest payments) is permanently greater than or equal to the rate of interest on government debt.

per year in new investment spending by permanent borrowing at five percent interest while receiving a return of ten percent on the investment (that is, an initial single “deposit” of $100 billion will immediately return $10 billion per year in higher GDP). Assume further that the initial level of GDP is $5 trillion, while the initial level of government debt is $2.5 trillion, so that the debt-to-GDP ratio is 50%. Both debt and GDP had been growing at a steady-state rate of 4%.

To report the bottom line first, the interesting result in such a situation is that the initial spike in the debt-to-GDP ratio does not fall immediately and, in fact, rises for several years before beginning to fall (the length of time depending on the assumptions one makes about GDP growth and other factors.) This anomaly is due to the increase in the interest rate (which is assumed to happen immediately) on all outstanding infra-marginal debt: after the first year, the $2.6 trillion debt has grown by $130 billion, to $2.73 trillion; but the initial GDP has grown by its steady-state rate of only 4% to $5.2 trillion, plus the $100 billion investment has returned ten percent to become $110 billion, for total GDP of $5.31 trillion. This makes debt/GDP, which had spiked to 50.98% after the spending was initiated, rise to 51.41% after one year. Debt/GDP continues to rise until the percentage of the economy growing at 10% annually is large enough to make the GDP grow faster than the debt.

A hidden assumption here is that the government spending multiplier is equal to one, since the $100 billion spending shows up as a $100 billion surge in GDP. If the government spending multiplier is greater than one (assuming that the entire multiplier shows up in GDP in the first year after the spending takes place>, the debt/GDP ratio might start trending down immediately or almost immediately. If the government

multiplier is less than one, of course, the process takes longer before the debt-to-GDP ratio turns down.

As a related matter, as the reference above to Eatwell indicates, the relevant cost of borrowing is the ***net*** cost of borrowing, i.e., the cost of borrowing after taking into account the taxes generated and the reduction in public unemployment payments. Hence, it is not accurate simply to assume that the government spending shows up dollar-for-dollar as greater debt and higher GDP. Even if the government spending multiplier is equal to one, the investment project generates employment, lowering transfer payments and raising tax revenues, unambiguously raising net taxes[39] and lowering the actual amount of borrowing. Whatever the interest rate at which the marginal borrowing occurs, this lowers the initial amount of borrowing and, hence, raises the annual rate of return of the project. If a $100 billion spending project returns $10 billion per year, as above, but only requires $80 billion dollars in net government financing, the net social rate of return is 12.5%. Higher and lower government spending multipliers affect this result in predictable ways.

Another very important assumption guiding these results is that the government spending project begins to pay its ten percent dividend immediately. In that way, it is like a consol bond with a price of $100 billion and a coupon payment of $10 billion. This is the best imaginable result of a real investment; but by far the more realistic situation is that the project takes several years before yielding any positive return. In the case of some proposed projects that would plausibly constitute "investment" by the public sector, the lag between the payment and the positive yields can be quite long

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39 This is true even when dealing with a cyclically-adjusted deficit.

indeed. For example, if increased spending on infant and child nutrition programs really does prevent brain damage and developmental difficulties, thus lowering later public spending on disabled adults while increasing social productivity (and thus GDP), it will be fifteen to twenty years before that return starts to show up in the economy. Therefore, the return to this investment could not even begin to lower the debt-to-GDP ratio for even longer than the previous analysis implies.

D. Estimating the Return to Public Investment

These theoretical and empirical issues argue that it is possible to have a rising debt-to-GDP ratio even if governments have done nothing "wrong"-whereas, continuing to assume that the only borrowing is on the capital account, one cannot have a falling debt-to-GDP ratio without the government having done something right in terms of public investment. Therefore, direct estimation of the social rate of return of public investments cannot, it seems, be side-stepped. [40]

Empirical studies of the rates of return to public investments provide wide-ranging and often contradictory results. Eisner [1994a] (citing Aschauer [1989], Munnell [1990], and Eisner [1991b]) offers results which are impressively indicative of high returns to public investment. Cautioning that the numbers are better taken as suggestive than precise, he notes that his results (which are based on cross-sectional data, not time

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[40] Erenburg's [1994] work, noted previously, suggesting that public investment encourages private investment in a direct sense-completely independent of a crowding-in effect, and quite possibly active even at full employment-suggests that this private-versus-public rate of return calculation need only be undertaken if the net change in private investment is negative (which is not certain, if her analysis is correct).

series) indicate that public investment has a gross marginal product 4.5 times that of private investment. Eisner and Pieper [1992] cite the general work of both Mansfield and Becker, indicating that the productivities of various types of public investment equal or surpass the productivities of gross private domestic investment. Similarly, Pinnoi [1994] analyzes public infrastructure spending by region and offers a positive assessment of the returns to basic infrastructure spending, but he notes (perhaps not surprisingly) that the effects are highly variable across regions and industries, depending on the types of infrastructure in which governments are investing.

Less sanguine assessments were offered by three other recent studies. Evans and Karras [1994] report no positive productivity at all (and perhaps even negative returns) from public investment, analyzed by comparing state-level data; Holtz-Eakin [1994] reports that education spending seems to have a competitive return, but that no other types of federal spending appear to have positive returns; and Nadiri and Mamuneas [1994] offer disappointing estimates of the social rate of return to two types of public investment: infrastructure and research and development. Using three different methods of estimation, they offer a range of estimated rates of return from 4.92% to 7.18% for infrastructure and 5.79% to 8.72% for R&D. Only the high estimate for R&D, however, exceeds their estimate of the social rate of return for private capital spending, which is 8.65% after-tax. (If this analysis is true, however, it immediately poses the question of why private capital has not been purchased in much greater amounts than it has been, given that real-world after-tax borrowing costs are often roughly half of Nadiri and Mamuneas's estimated rate of return. The most likely answer to this

puzzle would include the effects of risk, risk-aversion, the term structure, and the hurdle rates of return mentioned above.)

Two fundamental difficulties exist in all of these studies. First, there is the difficulty of separating marginal rates of return from average rates of return. While each study attempts to deal with this potential problem, it is a matter of contention how successful any have been in solving it. But even if they were perfectly reflecting the marginal return to various public investments, they all suffer from the second problem; namely, they are all retrospective rather than prospective. In other words, whatever one concludes from the contentious studies noted above, that would still not close the book on whether current policy should include public investment. What is really needed is an assessment of the rate of return of any proposed project ***before*** the project is initiated, since past failure is no guarantee of future failure-and past success does not guarantee that future public investments would pay off.

While this might seem to be asking too much of any decision-maker, in fact it is exactly the same problem that we assume is being solved by private decision-makers all the time. If-as standard theory asserts—firms assess their entire array of potential projects and initiate them until the net borrowing rate exceeds the projected return, then any other economic agent should be able to apply the same methods to assess the potential return to any other project. This is not intended to be an evasion of the issue; assessing potential rates of return is difficult and perilous for any analyst. The point here is simply that one decision-maker should not be held to a higher standard than another. If everyone is merely guessing, then work needs to be done to improve the methods of assessing potential returns for all projects; but that is not a reason to rule out potential projects

simply because they fall under the title "public spending."

IV. Econometric Results

I analyze the basic statistics for each of the thirteen deficit measures. Following that, I present analyses of correlations among the deficit measures and among the changes in the deficit measures. I also analyze econometric results for four equations: an inflation equation, an unemployment equation, and two GDP growth equations. Each of the four equations has a deficit variable on the right-hand side and is estimated separately for each of the thirteen measures of the deficit derived earlier. Three of the equations are designed to mimic analyses reported in Eisner [1991a], while the fourth (the second growth equation) is based on work reported in Eisner and Pieper [1992].

Finally, I estimate thirteen vector autoregressions (VAR) and thirteen corresponding impulse response functions (IRF) for five variables (a fiscal deficit measure, change in monetary base, GDP growth, inflation, and short-term interest rates), based on Eisner and Pieper [1992].

Because both Eisner [1991a] and Eisner and Pieper [1992] separate the post-1967 period from the pre-1967 period, only data beginning in 1967 is analyzed here (except for the VAR's, which are run from 1963-1993, where possible). The four versions of the deficit that include structural deficit estimates for the state and local sector (HEDT, PAHEDT, KPAHEDT and KLPAHEDT) are limited in all equations to the period 1973-1993, since the estimates from Kusko and Rubin [1993] begin in 1973. Also, the estimates for the Social Security system's unfunded liabilities begin in 1971, restricting KLPAHEDF to the 1971-1993 period.

A. Direct Comparisons and Correlations

Table 2 lists the basic summary statistics for each of the thirteen deficit measures, as well as the same statistics for each measure when divided by nominal GDP. The most remarkable aspect of these statistics is the extreme range of the KLPAHEDx measures. While the maximum deficit measured in any single year for the other eleven measures was $340.50 billion, both KLPAHEDF and KLPAHEDT had maximum values well in excess of four trillion dollars, fourteen times higher than the next highest measure. Similarly, the largest surplus measured in any given year for the first eleven measures was $172.29 billion, while both KLPAHEDx measures had years with surpluses of significantly more than three trillion dollars. Thus, even though the mean values of these two measures show only slightly larger surpluses on average than do the KPAHEDx measures, their standard deviations are over forty times larger than the standard deviations for those measures.

Among the first eleven measures, the lowest deficits are the KPAHEDx deficits, which actually were surpluses on average for the sample period. (This, of course, is true basically by construction, since only subtractions were made from PAHEDx to derive KPAHEDx.) The highest average measure of deficits was OBD, while PAHEDT was the lowest among non-capitalized measures. Generally, total-government deficit measures were lower than federal-only deficit measures, and a uniform decline can be also be seen as one increases the sophistication of the measures.[41]

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[41] The DDGDPx measures do not fit easily into a listing of more or less "sophisticated," since they do not include cyclical or price adjustments but do measure

Table 2: Comparison of Deficit Measures

Measure	Raw Numbers				As net. of nominal GDP			
	Max	Min	Mean	St.Dev.	Max	Min	Mean	St.Dev.
OBD	340.50	0.50	123.07	109.64	6.27%	0.05%	3.39%	1.75%
UDF	290.40	(3.20)	110.44	93.91	6.26%	-0.35%	3.09%	1.68%
UDT	264.58	(13.40)	70.24	77.10	4.46%	-0.65%	1.80%	1.51%
DDGDPF	nm	nm	nm	nm	3.75%	-2.76%	0.77%	1.95%
DDGDPT	nm	nm	nm	nm	3.97%	-3.32%	0.64%	2.17%
HEDF	215.00	7.00	84.52	69.85	4.53%	0.71%	2.50%	1.05%
HEDT	202.07	3.09	71.46	64.32	3.22%	0.20%	1.68%	1.02%
PAHEDF	144.36	(26.80)	36.96	52.32	3.35%	-1.02%	0.87%	1.26%
PAHEDT	125.35	(72.75)	8.14	52.81	2.00%	-2.45%	-0.26%	1.43%
KPAHEDF	36.03	(110.46)	(44.68)	37.35	0.73%	-6.50%	-2.60%	2.17%
KPAHEDT	(15.74)	(172.29)	(102.95)	37.94	-0.25%	-7.23%	-3.75%	2.11%
KLPAHEDF	4,374.67	(3,378.52)	(124.57)	1,508.02	202.87%	-138.92%	-8.35%	68.69%
KLPAHEDT	4,321.64	(3,426.30)	(198.36)	1,576.44	200.41%	-140.89%	-11.23%	71.90%

Figures are expressed in billions of dollars, except for percentages.
nm = not meaningful; measures are already defined as percentages of GDP
Sample period: 1967-1993, fiscal years; DDGDPF and DDGDPT are calendar years; KLPAHEDF is 1971-1993, fiscal years; HEDT, PAHEDT, KPAHEDT and KLPAHEDT are 1973-1993, fiscal years.
Sources: ***Economic Report of the President,*** 1994; ***Survey of Current Business,*** August 1994, ***Economic Indicators,*** September 1994, CitiBase, 1978; Social Security data provided by William Ritchie (Social Security Administration)

All of the deficit measures are spread similarly within their ranges. Looking at the standard deviations relative to the difference between the maximum and minimum values, for example, shows that double the standard deviations (within which two-thirds of all observations fall) covers between half and two-thirds of the total range. In other words, none of the series was noticeably more clustered than any other.

Table 3 shows the statistical correlations between each of the thirteen deficit measures, while Table 4 shows the correlations between annual changes in the levels of the variables. (Note: All remaining tables appear at

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changes in debt more accurately than OBD or UDx. Hence, when referring to more and less sophisticated measures, I will deliberately ignore DDGDPx.

the end of the text.) The lowest correlations are between DDGDPx and the other measures, especially in Table 4. Many of the regression results reflect these differences very clearly,

The effect of including state and local accounts can be seen by comparing UDF with UDT, HEDF with HEDT, PAHEDF with PAHEDT, DDGDPF with DDGDPT, KPAHEDF with KPAHEDT, and KLPAHEDF with KLPAHEDT. The correlations between these pairs of variables shows very similar results: while UDF and UDT weigh in at 0.918 and 0.907 (the correlations on Table 3 and Table 4, respectively), DDGDPF and DDGDPT have correlations of 0.975 and 0.976, HEDF and HEDT of 0.877 and 0.938, PAHEDF and PAHEDT of 0.946 and 0.970, KPAHEDF and KPAHEDT of 0.932 and 0.970, and KLPAHEDF and KLPAHEDT of 1.000 and 1.000.

Finally, following the federal-only measures through their theoretical improvements shows correlations between OBD and UDF of 0.963 and 0.992, between UDF and HEDF of 0.822 and 0.780, between HEDF and PAHEDF of 0.938 and 0.872, between PAHEDF and KPAHEDF of 0.983 and 0.987, and between KPAHEDF and KLPAHEDF of 0.086 and 0.192. Ignoring the last adjustment, the adjustments for structural deficits create the largest divergences. A similar progression for total-government measures shows the following: UDT to HEDT, 0.732 and 0.576; HEDT to PAHEDT, 0.938 and 0.824; PAHEDT to KPAHEDT, 0.967 and 0.984; and KPAHEDT to KLPAHEDT, -0.020, and 0.139. The adjustment for structural deficits again introduces by far the largest divergence in the variables. Notably, in neither case does the introduction of the first capital account seem to make much difference, while the KLPAHEDx measures are almost entirely uncorrelated to the other series.

These extreme results make KLPAHEDF and KLPAHEDT

essentially non-comparable to the other eleven measures. In most of the regressions reported below, even the signs of the estimated coefficients on the last two deficit variables differ from the signs for all (or almost all) of the other eleven measures. Their estimates are reported in the tables, but no useful comparisons can be made. Therefore, I will not continue to comment on these measures.

B. Correlations to Other Macroeconomic Variables

My analysis of the regression results will emphasize three questions: first, is the explanatory power of a regression improved by increasing the sophistication of the deficit measure-looking especially at PAHEDx, which is the measure that would theoretically be most appropriate for these equations? Second, is the explanatory power of the regression improved by replacing any particular federal-only deficit measure with a total-government measure (denoted by the letter T)? Third, do the signs of the estimated coefficients of the deficit variables match those that would be expected by the theory described earlier? In the subsequent section, my analysis of the VAR's and IRF's will proceed along similar lines.

Each equation's results are reported in Tables 5 through 8. Each equation was estimated with contemporaneous values of the deficit variables in simple ordinary least-squares regressions and in AR(1) regressions (the top two panels in each table), with lagged values of the deficit variables in simple OLS regressions and in AR(1) regressions (the middle panels in each table)[42], in instrumental variables (I.V.) equations

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[42] The reported AR(1) results are provided simply to provide comparability with many of the results from Eisner. The Durbin-Watson statistics for all of the OLS regressions (of all four basic equations) are comfortably in the range that indicates that

with an extensive set of instruments, and in I.V. equations with a limited set of instruments (the bottom panels in each table).

I report the estimated t-statistics for the independent deficit variable in each equation, making a simple set of comparisons of the explanatory power of federal-only *uersus* total-government deficit measures (reading across in each panel) as well as comparisons of crude *uersus* sophisticated deficit measures (reading down in each panel).

Every effort has been made to follow the methodology of Eisner [1991a] and Eisner and Pieper [1992], allowing for the expanded sample and for several computational differences used in this analysis. The specifications of the equations were chosen based on the conclusions in the papers noted; that is, while Eisner reports results which test different specifications of an equation, the equations here replicate his "preferred" specifications.

The first panel in each table represents the simplest method of estimating each equation: ordinary least squares, with contemporaneous

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serial correlation is not a problem, and the Q-statistics indicate that higher-order serial correlation was not present, either. In the AR(1) regressions (both the regressions summarized in Tables 5 through 8 and those run but not reported for the instrumental variables regressions), moreover, estimates of rho were significant in only a tiny minority of cases.

Therefore, if the point of this exercise were simply to report the "preferred results" from my empirical analyses, only OLS results would be needed. Since Eisner's diagnostics argued otherwise, however, it is useful to report the AR(1) results for my comparable regressions-if for no other reason than to show that those results argue for the same conclusions.

values of the deficit. It should be noted, however, that there are good reasons to believe a priori that these specifications might be inappropriate. First, as time series regressions, they are subject to potential serial correlation. While the relevant diagnostics do not, as noted previously, indicate that this is a problem, the results of the same regressions using AR(l) correction are shown in the upper-right panel of each table.

Second, there is a strong possibility of reverse causality between the left-hand and right-hand variables. (For example, changes in inflation might cause changes in deficits, rather than vice versa.) There are two ways to correct for this: simple one-year lags on the deficit variables (which are reported in the middle panels), or formal instrumental variables (I.V.) estimation. The lower left panels report the results of I.V. tests where the instrument set is rather large. The uniformly poor results in these tables is most likely due to the problem of "over-identified" instruments, which is particularly problematic with extremely small samples such as those used here [see Nelson and Startz, 1990]—especially the total-government measures. Therefore, I.V. tests with more limited instrument sets are performed, with results reported in the lower-right panel of each table.

A third reason to suspect that the simple regressions are inappropriate applies specifically to the two GDP growth equations. Since each of the deficit measures has current nominal GDP in the denominator, and the change in current real GDP is the endogenous variable, this creates a possible built-in tendency for the coefficient of the deficit variable to be negative (inasmuch as nominal and real GDP are correlated with each other). Thus, the lagged tests and, in particular, the I.V. tests will be crucial for testing and verifying relationships between deficits and real GDP growth.

Since the analysis of each of the four basic equations is very similar, I will explain in some detail only the results of the regressions for the inflation equation. Following that, I will summarize the results and conclusions for the other three equations, based on the three criteria noted above.

OLS Regressions **With Contemporaneous and Lagged Deficits**

In the upper-left panel of Table 5,[43] the t-statistics for the deficit variables show no general pattern as one moves from cruder to more sophisticated measures. For federal-only measures, moving from OBD to KPAHEDF (and, for reasons noted previously, setting DDGDPx aside) makes things marginally worse with the notable exception of PAHEDF, which has the only t-statistic which is significant at the 95% level. For total government measures, moving from UDT to HEDT makes matters worse, but the move to PAHEDT again provides coefficients which are significant at the 95% level; KPAHEDT slightly weakens the results, although the coefficient is still significant. In general, then, the PAHEDx regressions give the strongest results, as would expected. The relative strength of the federal-only measures over the total-government measures is mixed, however, with only two of the five pairs (omitting, here as subsequently, the KLPAHEDx pair) dominated by the total-government measure. This is not, of course, what the theory discussed previously would lead one to expect.

In the same equation, but with the deficit variable lagged by one year (the middle-left panel of the table), the federal-only results are uniformly low. The t-statistics fall as the deficit measure becomes more sophisticated,

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[43] The verbal descriptions of regression results will only discuss the OLS regressions, since the AR(1) regressions are provided only for the interested reader.

from OBD to UDF and HEDF; and although the absolute values then rise (while staying quite low in absolute terms) with PAHEDF and KPAHEDF, the sign of KPAHEDF is reversed. The most significant form of the total-government deficits is KPAHEDT, although HEDT and PAHEDT are also each significant at the 95% level. In this case, however, all five pairings show the total-government measure with a much higher t-statistic than the federal-only measure.

Instrumental Variables

The instrumental variables estimates are reported in the lower panels of Table 5. While the larger set of instruments (as expected) did not provide statistical significance (except in one case, KPAHEDT), the limited set of instruments made the results less significant as often as it improved them. For the full instrument set, the federal-only variable with the highest t-statistic is HEDF, which is higher than PAHEDF's, but of the opposite sign. For the limited instrument set, PAHEDF is the top performer.

The total-government deficit measures are led by KPAHEDT in both panels, with the relationships between UDT, HEDT, PAHEDT, and KPAHEDT following no useful pattern except that PAHEDT has a higher t-statistic than HEDT in both panels. For the full instrument set, the total-government equations are better than the federal-only measures in three of five cases, while they are better in all five cases for the limited instrument set.

Regarding the expected sign of the coefficient on the deficit variables, the results are mixed, but generally argue *against* the theoretical concern that deficits are inflationary. While a few results have positive coefficients on the deficit variables (reflected in the tables by positive t-statistics), none of

those t-statistics are significant. For the most significant estimates, moreover, the signs are negative, indicating that higher deficits cause lower inflation-not higher inflation. This extremely counter-intuitive result will be tested again in the VAR and IRF results reported below.

Other Equations[44]

UNEMPLOYMENT: Table 6 reports the results of the thirteen regressions which attempt to explain changes in the unemployment rate as a function of the deficit and lagged changes in the real exchange rate. The equations which used contemporaneous values of the deficit measures performed uniformly poorly,[45] while the regressions with lagged deficit measures had very significant t-statistics in a large number of cases. The I.V. results were not as strong as for the lagged deficits, but the limited instrument set was generally stronger than the full instrument set.

There was only modest improvement as the measures became more sophisticated; and there was, contrary to expectations, a general pattern of federal-only measures outperforming total-government measures.

The signs of virtually all of the coefficients are negative, confirming the theoretical benefit of deficits, i.e., higher deficits lead to decreases-or, at least, to smaller increases-in unemployment.

GDP GROWTH: Table 7 reports the results of the thirteen

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[44] For all three remaining equations, the values of R-bar^2 (not reported on the tables) are in many cases quite low-on the order of 0.01 to 0.05. Even so, analysis of the t-statistics of the deficit variables is useful.

[45] The notable exceptions are the DDGDPx variables, which showed significant results on Tables 6, 7, and 8 ***only*** for the upper panels, with very insignificant results for lagged and I.V. equations.

regressions which attempt to explain changes in GDP growth as a function of the deficit and lagged changes in the real exchange rate. Only DDGDPx estimates have significant results for the equations with contemporaneous values of the deficit measures. In the lagged deficit equations, while PAHEDF had the highest t-statistic among federal-only measures, the overall highest result was for UDT, among the crudest of measures. The I.V. results were all very weak.

More sophisticated measures showed generally stronger results for the federal-only but not for the total-government measures, with the latter group being mixed. Once again, the federal-only measures outperformed the total-government measures in a bare majority of cases, although this set of theoretical anomalies included the especially important comparison of PAHEDF and PAHEDT.

The very significant negative signs of the DDGDPx measures in the upper panels should not be taken too seriously, however, since the built-in bias toward negative coefficients is at work here. (Indeed, in the non-contemporaneous regressions, the coefficients for those two measures are insignificant and, with one exception, positive.) In the other panels, although very few of the t-statistics are significant, the signs of the deficit coefficients are almost all positive, again lending some support to the theoretical benefit of deficits, i.e., higher deficits lead to higher GDP growth.

Table 8 reports the results of the thirteen regressions which attempt to explain changes in the unemployment rate as a function of the deficit and lagged changes in the monetary base. The results do not differ in any notable way from the results in the previous growth equation. More sophisticated measures do not outperform cruder measures, federal-only

measures generally outperform total-government measures, PAHEDF is the strongest variable in lagged and I.V. equations, and the signs of the deficit coefficients tend to confirm the theory.

C. Vector Autoregressions and Impulse! Response Functions

Table 9 presents the results of vector autoregressions and impulse response functions for the thirteen deficit measures in models with the following variables (each with two lags): change in the real monetary base, percentage change in GDP, inflation (as measured by the annual percentage change in the implicit GDP deflator), and short-term interest rates (the discount rate on three-month U.S. Treasury Bills). This follows the method in Eisner and Pieper [1992].

For each of the deficit measures, I report the significance level of the F-statistic for the deficit variable (testing whether the coefficients on both lags of the deficit are zero) in regressions against the two target variables, GDP growth and inflation. [Note: Lower significance levels imply stronger results.] Also, seven-year time path responses of the five variables, based on an impulse of one percentage point increase in the deficit (measured as a percentage of GDP) are shown.

GDP GROWTH: For the GDP growth variable, the deficit measure with the best F-statistic is OBD, the crudest measure. Moving to UDF, HEDF, PAHEDF, and KPAHEDF does not produce a uniform change in the F-statistics, and HEDF is the only other deficit measure with a significance level below 0.2. HEDT to is the most significant total-government deficit measure, and moving from HEDT to PAHEDT to KPAHEDT shows a general increase in significance levels, rather than the hoped-for decrease. Again, the federal-only measures seem to dominate the total-government

measures.[46]

Despite monetary policy being generally accommodative, based on the time paths of ΔMB, the growth of GDP turns negative for periods 3 through 5 or longer in virtually every case. However, while the negative GDP growth might tend to support some versions of the crowding out story, the upturn in GDP growth for the later years (especially for PAHEDx) somewhat offsets this. The IRF's, therefore, lead to contradictory conclusions about the connections between deficits and growth.

INFLATION: For the inflation variable, HEDT and UDF have the two best significance levels for their F-statistics. PAHEDF has the worst result of all, while even the OBD measure is demonstrably stronger. For total-government measures, HEDT again outperforms everything, including PAHEDT, which theoretically should perform best. Unlike nearly all prior results, however, the total-government measures are much stronger than the federal-only measures.

Although many of the deficit measures show a time path of inflation that is mixed in sign, both HEDT and PAHEDT show inflation falling very consistently after the deficit impulse. Thus, although the evidence is somewhat mixed, the suggestion is again that the increase in the deficit is, if anything, anti-inflationary (and in any case not demonstrably inflationary).

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[46] The usefulness of the total-government measures in VAR's is highly questionable due to the small samples. Each of the VAR regressions with HEDT, PAHEDT, and KPAHEDT have only 8 degrees of freedom. Even so, in some cases the total-government measures had lower significance levels than other measures.

D. Summarizing the Results

The overall results that are of most interest can be summarized in the categories of "HEDx us. PAHEDx," best federal-only measure, best total-government measure, best overall measure, and the comparative results of paired federal-only and total-government measures. These comparisons can be made among all twenty-six empirical tests (six different specifications for each of four different equations, along with two VAR comparisons), among the twenty-four empirical tests excluding the VAR's, among the sixteen OLS regressions, and among the eight lagged and limited-I.V. regressions (which tended to have the stronger results).

Since the VAR results were very different from the rest, however, they should be summarized separately. In both cases, HEDx gave better results than PAHEDx; the federal-only measures were dominated by OBD and UDF, while the total-government measures were dominated by HEDT; and the best overall result was given by OBD in one case and HEDT in the other. Very little support is given to the supposed primacy of PAHEDx measures in these results.

Among the non-VAR results, however, the most notable result is the strong confirmation of Eisner's conclusion that PAHEDF provides better statistical results than does HEDF. This is true in all but one of the twenty-four regression comparisons, the only exception being a full-I.V. regression. To the contrary, though, HEDT held its own against PAHEDT, evenly splitting the eight lagged and limited-I.V. regressions.

The strongest federal measure was overwhelmingly PAHEDF, which dominated in 13 of 24 panels and, more significantly, in 11 of 16 OLS regressions and 7 of 8 lagged and limited-I.V. regressions. The total-government side, however, had much less clear-cut results, with UDT and

KPAHEDT performing as well as or better than PAHEDT in each of the sub-groupings.

The best overall results were also split. Roughly half of each sub-grouping was dominated by PAHEDF, with the other half split between UDT and KPAHEDT. Significantly, PAHEDT was ***never*** the strongest overall measure of the fiscal deficit.

Finally, the comparisons of each pair of measures (UDF and UDT, DDGDPF and DDGDPT, etc.) showed a consistently narrow advantage to the federal-only measures, no matter how narrow the sub-grouping. For all 26 tests, with five pairings in each (again, ignoring KLPAHEDx), there were 130 comparisons; and the federal-only measure was more significant in 69 cases. In the 120 non-VAR comparisons, federal-only measures won 64 direct comparisons; 43 of 80 OLS tests; 22 of 40 lagged and limited I.V. tests; and 12 out of 20 lagged pairings. Among just the PAHEDx comparisons, moreover, PAHEDF had higher diagnostic statistics even more frequently-roughly two-thirds of the cases showed PAHEDT performing worse than PAHEDF. There was clearly no consistent advantage gained by including the state and local sector in the calculation of the fiscal deficit.

V. Conclusions

The weaknesses in the official debt and deficit accounts, and the purported harms of deficits, have brought forth useful analyses of what deficit measures are best and what harms-or benefits-actually occur as a result of deficit spending. However, for at least some of the potential uses to which deficit measures might be put, there is a disappointing divergence

between what is theoretically “best” and what performs best in empirical tests. While one can tentatively conclude that, at least for the specifications tested here, careful adjustment of deficit measures for cyclical factors and price effects does generally improve the statistical explanatory power of federal-only deficits, the inclusion of state and local accounts actually degrades the results.

Overall, the empirical conclusion must be that, if theoretically better deficit measures are empirically more useful, the specifications that will demonstrate this are yet to be tested. Still, however, if one had to choose a single measure of the deficit for empirical testing, these results argue (in a way that is, admittedly, not overwhelming) for using PAHEDF.

This is not to say that the improvement of deficit measures is pointless. Since much of the analysis of deficits is done simply to answer the question of whether we are currently running a surplus or a deficit (and, by implication, whether we need to cut spending or raise taxes), policy conclusions independent of these regression results are still at stake.

The separation of government accounts into appropriately-measured capital and operating accounts is also, in and of itself, useful. For, while it ought to be obvious that spending decisions by any economic agent should be made on the basis of alternative costs and benefits, the related policy lesson is constantly being re-learned: deficit spending is not presumptively bad; it is only bad when it replaces something better. This is understandably difficult if one believes that the actual deficit spending in the nineteen eighties was a long series of mistakes. Even if that is true, however, these mistakes are sunk costs; what remains is to learn the right lessons from our experience.

Finally, it is crucial to point out that both OBD and UDF, the two most

commonly discussed measures of the deficit, are not only crudely measured but performed especially poorly in virtually all of the empirical comparisons reported above. Therefore, it should be clear that their continued use as a focus of analysis (and constitutional amendments) is dangerous and misguided.

Table 3: Correlation Matrix for Thirteen Deficit Measures

	OBD	UDF	UDT	DDGDPF	DDGDPT	HEDF	HEDT	PAHEDF	PAHEDT	KPAHEDF	KPAHEDT	KLPAHEDF	KLPAHEDT
OBD	1.000												
UDF	0.963	1.000											
UDT	0.934	0.918	1.000										
DDGDPF	0.857	0.862	0.927	1.000									
DDGDPT	0.859	0.816	0.908	0.975	1.000								
HEDF	0.859	0.822	0.748	0.615	0.596	1.000							
HEDT	0.804	0.670	0.732	0.567	0.620	0.877	1.000						
PAHEDF	0.812	0.742	0.767	0.636	0.637	0.938	0.876	1.000					
PAHEDT	0.732	0.607	0.716	0.549	0.585	0.846	0.938	0.946	1.000				
KPAHEDF	0.752	0.695	0.735	0.585	0.568	0.909	0.855	0.983	0.949	1.000			
KPAHEDT	0.614	0.511	0.639	0.451	0.462	0.769	0.875	0.882	0.967	0.932	1.000		
KLPAHEDF	0.161	0.193	0.083	0.070	0.066	0.169	0.019	0.116	0.024	0.086	-0.020	1.000	
KLPAHEDT	0.157	0.188	0.080	0.066	0.063	0.165	0.018	0.112	0.023	0.083	-0.020	1.000	1.000

Sample **penod:** 1973-93. Source: Author's estimates.

Table 4: Correlation Matrix for *Changes* in Thirteen Deficit Measures

	OBD	UDF	UDT	DDGDPF	DDGDPT	HEDF	HEDT	PAHEDF	PAHEDT	KPAHEDF	KPAHEDT	KLPAHEDF	KLPAHEDT
OBD	1.000												
UDF	0.992	1.000											
UDT	0.897	0.907	1.000										
DDGDPF	0.683	0.678	0.831	1.000									
DDGDPT	0.613	0.604	0.765	0.976	1.000								
HEDF	0.784	0.780	0.570	0.291	0.194	1.000							
HEDT	0.769	0.748	0.576	0.316	0.252	0.938	1.000						
PAHEDF	0.626	0.630	0.505	0.301	0.185	0.872	0.775	1.000					
PAHEDT	0.602	0.596	0.492	0.283	0.174	0.845	0.624	0.970	1.000,				
KPAHEDF	**0.572**	**0.580**	**0.455**	**0.253**	**0.133**	**0.850)**	**0.754**	**0.987**	**0.963**	**1.000**			
KPAHEDT	**0.535**	**0.534**	**0.432**	**0.223**	**0.108**	**0.815**	**0.792**	**0.949**	**0.984**	**0.970**	**1.000**		
KLPAHEDF	**0,321**	**0.315**	**0.244**	**0.154**	**0.166**	**0.328**	**0.231**	**0.223**	**0.172**	**0.192**	**0.139**	**1.000**	
KLPAHEDT	**0.321**	**0.315**	**0.244**	**0.154**	**0.166**	**0.328**	**0.231**	**0.222**	**0.172**	0.192	**0.139**	1.000	

Sample period: **1974-93.** Source: Author's estimates.

Table 5: Thirteen Versions of the Fiscal Deficit: a Comparison of Estimated t-statistics—the Inflation Equation

$$INF_t = b_0 + b_1 INF_{t-1} + b_2 U_t + b_3 DEFICIT_t$$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	**-0.97**		
UDF	-0.90	**UDT**	**-1.49**
DDGDPF	-0.28	DDGDPT	**-0.09**
HEDF	-0.91	HEDT	-0.67
PAHEDF	-2.77	PAHEDT	-2.51
KPAHEDF	-0.61	KPAHEDT	-2.21
KLPAHEDF	-0.02	KLPAHEDT	0.05

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	**-1.05**		
UDF	**-0.92**	UDT	-1.29
DDGDPF	**-0.32**	DDGDPT	-0.04
HEDF	**-0.95**	HEDT	-1.02
PAHEDF	**-2.57**	PAHEDT	-2.64
KPAHEDF	**-2.16**	**KPAHEDT**	-3.16
KLPAHEDF	**0.09**	KLPAHEDT	0.03

Lagged Deficit: $INF_t = b_0 + b_1 INF_{t-1} + b_2 U_t + b_3 DEFICIT_{t-1}$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	**-0.69**		
UDF	**-0.54**	**UDT**	-1.36
DDGDPF	**-0.94**	DDGDPT	-1.63
HEDF	**-0.24**	HEDT	-2.77
PAHEDF	**-0.44**	PAHEDT	**-2.71**
KPAHEDF	0.67	**KPAHEDT**	3.64
KLPAHEDF	0.70	KLPAHEDT	0.75

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	-1.01		
UDF	-0.74	UDT	-1.42
DDGDPF	-1.06	DDGDPT	-1.81
HEDF	-0.54	HEDT	-2.41
PAHEDF	-0.86	PAHEDT	-2.32
KPAHEDF	-0.09	**KPAHEDT**	-3.44
KLPAHEDF	0.66	KLPAHEDT	0.83

Instrumental Variables: $INF_t = b_0 + b_1 INF_{t-1} + b_2 U_t + b_3 DEFICIT_t$

Federal-Only Deficit Measure	t statistic[3]	Total-Government Deficit Measure	t statistic[3]
OBD	-0.12		
UDF	0.29	UDT	-0.54
DDGDPF	0.32	DDGDPT	-0.22
HEDF	**0.74**	HEDT	-0.39
PAHEDF	-0.20	PAHEDT	-1.33
KPAHEDF	0.69	**KPAHEDT**	**-2.74**
KLPAHEDF	-0.46	KLPAHEDT	-0.64

Federal-Only Deficit Measure	t statistic[4]	Total-Government Deficit Measure	t statistic[4]
OBD	-0.30		
UDF	**-0.06**	UDT	-0.55
DDGDPF	**-0.04**	DDGDPT	-0.40
HEDF	0.19	HEDT	-0.63
PAHEDF	**-0.83**	PAHEDT	-1.36
KPAHEDF	0.51	KPAHEDT	-2.70
KLPAHEDF	-0.54	KLPAHEDT	-0.66

1 Ordinary Least Squares
2 Least S&ares with Cochrane-Orcutt AR(1) correction
3 Two-Stage Least Squares, full instrument set
4 Two-Stage Least Squares, limited instrument set

Bold indicates highest t-statistic (in absolute value) among estimates in the same column, excluding KLPAHEDF and KLPAHEDT.

Sample period: 1967-93, annual data, except for HEDT, PAHEDT, and KPAHEDT, which have sample period 1973-93, and KLPAHEDF, which has sample period 1971-93. DDGDPF and DDGDPT are calendar years; all others are fiscal years.

INF = inflation (percentage change in implicit GDP deflator)

U = Unemployment rate (number unemployed as a percentage of the total labor force j

DEFICIT = one of thirteen measures of the government deficit

Source: Author's regressions.

Table 6: Thirteen Versions of the Fiscal Deficit: a Comparison of Estimated t-statistics—the Unemployment Equation

$$\Delta U_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_t$$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	**0.46**		
UDF	**0.55**	**UDT**	**1.36**
DDGDPF	**2.01**	DDGDPT	2.08
HEDF	**-0.91**	HEDT	-0.14
PAHEDF	**-1.10**	PAHEDT	-0.57
KPAHEDF	**-0.88**	**KPAHEDT**	-0.55
KLPAHEDF	**-0.16**	**KLPAHEDT**	**-0.18**

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	**1.11**		
UDF	1.06	UDT	3.12
DDGDPF	6.72	**DDGDPT**	6.01
HEDF	**0.88**	HEDT	-0.22
PAHEDF	**1.00**	PAHEDT	-0.60
ECPAHEDF	0.93	**KPAHEDT**	-0.71
KLPAHEDF	-0.06	**KLPAHEDT**	-0.10

Lagged Deficit: $\Delta U_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_{t-1}$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	-2.17		
UDF	-2.37	**UDT**	-2.32
DDGDPF	-0.78	**DDGDPT**	-0.31
HEDF	-2.94	HEDT	-1.47
PAHEDF	**-3.47**	PAHEDT	-1.92
KPAHEDF	-1.92	**KPAHEDT**	-1.56
KLPAHEDF	-1.48	KLPAHEM'	-1.37

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	-2.63		
UDF	**-2.87**	**UDT**	-2.74
DDGDPF	**-0.93**	**DDGDPT**	-0.40
HEDF	**-2.97**	HEDT	-1.52
PAHEDF	**-3.43**	PAHEDT	-1.95
KPAE-IEDF	**-2.32**	KPAHEDT	-1.64
KLPAHEDF	**-1.45**	KLPAHEDT	-1.36

Instrumental Variables: $\Delta U_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_t$

Federal-Only Deficit Measure	t statistic[3]	Total-Government Deficit Measure	t statistic[3]
OBD	-0.54		
UDF	-0.53	UDT	-0.67
DDGDPF	0.02	DDGDPT	0.47
HEDF	-1.27	HEDT	-0.67
PAHEDF	-1.78	PAHEDT	-1.03
KPAHEDF	**-1.19**	KPAHEDT	-1.11
KLPAHEDF	0.96	KLPAHEDT	0.83

Federal-Only Deficit Measure	t statistic[4]	Total-Government Deficit Measure	t statistic[4]
OBD	-1.57		
UDF	-1.52	UDT	-1.57
DDGDPF	-0.43	DDGDPT	0.23
HEDF	-1.91	HEDT	-1.31
PAHEDF	-2.32	PAHEDT	-1.58
KPAHEDF	-1.56	KPAHEDT	-1.42
KLPAHEDF	0.89	KLPAHEDT	0.81

1 Ordinary Least Squares
2 Least Squares with Cochrane-Orcutt AR(1) correction
3 Two-Stage Least Squares, full instrument set
4 Two-Stage Least Squares, limited instrument set

Bold indicates highest t-statistic (in absolute value) among estimates in the same column, excluding KLPAHEDF and KLPAHEDT.

Sample period: 1967-93, annual data, except for HEDT, PAHEDT, and KPAHEDT, which have sample period 1973-93, and KLPAHEDF, which has sample period 1971-93. DDGDPF and DDGDPT are calendar years; all others are fiscal years.

ΔU = annual change in unemployment rate

ΔERR = annual change in real exchange rate

DEFICIT = one of thirteen measures of the government deficit

Source: Author's regressions.

Table 7: Thirteen Versions of the Fiscal Deficit: a Comparison of Estimated t-statistics—the Growth Equation (with Exchange Rates)

$$\%\Delta GDP_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_t$$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	-0.77		
UDF	**-0.70**	**UDT**	-1.39
DDGDPF	**-2.88**	DDGDPT	**-3.30**
HEDF	**0.70**	HEDT	0.07
PAHEDF	**1.01**	PAHEDT	0.37
KPAHEDF	**0.20**	KPAHEDT	0.06
KLPAHEDF	**-0.55**	KLPAHEDT	-0.55

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	**-0.67**		
UDF	**-0.59**	UDT	**-1.30**
DDGDPF	**-4.71**	DDGDPT	**-6.14**
HEDF	**0.70**	HEDT	0.43
PAHEDF	**0.94**	PAHEDT	0.58
KPAHEDF	**0.33**	KPAHEDT	0.52
KLPAHEDF	**-0.55**	KLPAHEDT	-0.43

Lagged Deficit: $\%\Delta GDP_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_{t-1}$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	1.39		
UDF	1.56	**UDT**	2.04
DDGDPF	0.83	**DDGDPT**	0.42
HEDF	1.54	HEDT	1.19
PAHEDF	1.90	PAHEDT	1.16
KPAHEDF	0.52	KPAHEDT	0.83
KLPAHEDF	1.41	KLPAHEDT	1.34

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	3.09		
UDF	3.07	**UDT**	3.81
DDGDPF	1.30	**DDGDPT**	0.65
HEDF	1.74	**HEDT**	1.11
PAHEDF	2.02	**PAHEDT**	1.09
KPAHEDF	0.80	**KPAHEDT**	0.75
KLPAHEDF	1.68	**KLPAHEDT**	1.56

Instrumental Variables: $\%\Delta GDP_t = b_0 + b_1 \Delta ERR_{t-4} + b_2 DEFICIT_t$

Federal-Only Deficit Measure	t statistic[3]	Total-Government Deficit Measure	t statistic[3]
OBD	-0.12		
UDF	-0.07	**UDT**	**0.61**
DDGDPF	0.22	DDGDPT	**0.22**
HEDF	0.34	HEDT	0.14
PAHEDF	1.19	PAHEDT	0.41
KPAHEDF	0.06	KPAHEDT	0.36
KLPAHEDF	**-1.50**	**KLPAHEDT**	**1.47**

Federal-Only Deficit Measure	t statistic[4]	Total-Government Deficit Measure	t statistic[4]
OBD	0.47		
UDF	0.45	UDT	0.90
DDGDPF	0.67	DDGDPT	0.11
HEDF	1.11	HEDT	0.82
PAHEDF	1.83	**PAHEDT**	0.91
KPAHEDF	0.34	KPAHEDT	0.60
KLPAHEDF	**-1.13**	KLPAHEDT	-1.03

1 Ordinary Least Squares
2 Least Squares with Cochrane-Orcutt AR(1) correction
3 Two-Stage Least Squares, full instrument set
4 Two-Stage Least Squares, limited instrument set

Bold indicates highest t-statistic (in absolute value) among estimates *in the* same column, excluding KLPAHEDF and KLPAHEDT.

Sample period: 1967-93, annual data, except for HEDT, PAHEDT, and KPAHEDT, which have sample period 1973-93, and KLPAHEDF, which has sample period 1971-93. DDGDPF and DDGDPT are calendar years; all others are fiscal years.

$\%\Delta GDP$ = percentage change in annual real GDP

ΔERR = annual change in real exchange rate

DEFICIT = one of thirteen measures of the government deficit

Source: Author's regressions.

Table 8: Thirteen Versions of the Fiscal Deficit: a Comparison of Estimated t-statistics—the Growth Equation (with Monetary Policy)

$$\%\Delta GDP_t = b_0 + b_1 \Delta MB_{t-1} + b_2 DEFICIT_t$$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	-1.21		
UDF	-0.83	UDT	-1.75
DDGDPF	-8.07	DDGDPT	-3.94
HEDF	0.44	HEDT	-0.59
PAHEDF	0.72	PAHEDT	-0.22
KPAHEDF	-0.35	KPAHEDT	-0.72
5PAHEDF'	-0.53	KLPAHEDT	-0.54

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	-1.05		
UDF	-0.69	UDT	-1.61
DDGDPF	-3.70	DDGDPT	-5.42
HEDF	0.51	HEDT	-0.10
PAHEDF	0.72	PAHEDT	0.13
KPAHEDF	-0.09	KPAHEDT	-0.07
KLPAHEDF	-0.62	KLPAHEDT	-0.53

Lagged Deficit: $\%\Delta GDP_t = b_0 + b_1 \Delta MB_{t-1} + b_2 DEFICIT_{t-1}$

Federal-Only Deficit Measure	t statistic[1]	Total-Government Deficit Measure	t statistic[1]
OBD	0.72		
UDF	1.13	UDT	1.62
DDGDPF	0.56	DDGDPT	-0.01
HEDF	1.02	HEDT	0.41
PAHEDF	1.47	PAHEDT	0.30
KPAHEDF	0.30	KPAHEDT	-0.25
KLPAHEDF	0.94	KLPAHEDT	0.85

Federal-Only Deficit Measure	t statistic[2]	Total-Government Deficit Measure	t statistic[2]
OBD	2.81		
UDF	2.76	UDT	3.47
DDGDPF	1.34	DDGDPT	0.50
HEDF	1.37	HEDT	0.54
PAHEDF	1.67	PAHEDT	0.42
KPAHEDF	0.09	KPAHEDT	-0.31
KLPAHEDF	1.38	KLPAHEDT	1.29

Instrumental Variables: $\%\Delta GDP_t = b_0 + b_1 \Delta MB_{t-1} + b_2 DEFICIT_t$

Federal-Only Deficit Measure	t statistic[3]	Total-Government Deficit Measure	t statistic[3]
OBD	-0.26		
UDF	0.04	UDT	0.36
DDGDPF	0.39	DDGDPT	-0.27
HEDF	0.36	HEDT	0.02
PAHEDF	0.91	PAHEDT	0.21
KPAHEDF	-0.33	KPAHEDT	-0.34
KLPAHEDF	-1.31	KLPAHEDT	1.17

Federal-Only Deficit Measure	t statistic[4]	Total-Government Deficit Measure	t statistic[4]
OBD	-0.06		
UDF	0.20	UDT	0.61
DDGDPF	0.54	DDGDPT	-0.21
HEDF	0.63	HEDT	-0.07
PAHEDF	1.41	PAHEDT	-0.05
KPAHEDF	-0.42	KPAHEDT	-0.64
KLPAHEDF	0.96	KLPAHEDT	-0.78

1 Ordinary Least Squares
2 Least Squares with Cochrane-Orcutt AR(1) correction
3 Two-Stage Least Squares, full instrument set
4 Two-Stage Least Squares, limited instrument set

Bold indicates highest t-statistic (in absolute value) among estimates in the same column, excluding KLPAHEDF and KLPAHEDT.

Sample period: 1967-93, annual data, except for HEDT, PAHEDT, and KPAHEDT, which have sample period 1973-93, and KLPAHEDF, which has sample period 1971-93. DDGDPF and DDGDPT are calendar years; ail others are fiscal years.

$\%\Delta GDP$ = percentage change in annual real GDP

ΔMB = change in real monetary base as a percentage of real GDP

DEFICIT =one of thirteen measures of the government deficit

Source: Author's regressions.

Table 9: Vector Autoregressions—Budget Deficits, the Monetary Base, GDP, Inflation, and Interest Rates

VARs with 2 Lags, orderings: Deficit, MBCH, %ΔGDP, INF, RSHORT. Impulse response functions to **one** percentage **point shock in deficit variable.**

ΔMB = change in **real** monetary **base, measured in percent of real GDP.**
%ΔGDP = annual percentage change in real GDP, expressed in percent.
INF = inflation, annual percentage change in implicit **GDP defl ator, expressed** in percent.
RSHORT = interest rate on 3-month U.S. Treasury Bills, expressed in percent per annum.

OBD

Year	DEFICIT	AMB	%ΔGDP	INF	RSHORT
0	1.000	0.000	0.000	**0.000**	**0.000**
1	**0.376**	**0.009**	**0.275**	**0.076**	**0.063**
2	0.315	0.031	-0.612	**-0.200**	**-0.088**
3	0.301	0.021	-0.348	**-0.025**	**0.005**
4	0.181	0.003	-0.276	0.115	**0.057**
5	0.172	0.005	-0.156	0.122	**0.029**
6	0.103	0.003	-0.091	0.110	**0.042**
7	0.073	0.001	-0.064	0.123	**0.088**

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable:	0.113
Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable:	0.127

UDF

Year	DEFICIT	ΔMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	**0.000**	0.000
1	0.283	0.016	0.324	0.054	0.035
2	0.155	0.029	-0.581	-0.242	-0.050
3	0.204	0.018	-0.287	-0.009	0.100
4	0.122	-0.001	-0.324	0.130	0.118
5	0.177	0.006	-0.143	0.095	0.032
6	0.096	0.005	-0.017	0.047	0.015
7	0.063	0.003	0.00 1	0.054	0.065

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable:	0.226
Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable:	0.097

Table 9 (continued): Vector Autoregressions—Budget Deficits, the Monetary Base, GDP, Inflation, and Interest Rates

UDT

Year	DEFICIT	AMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.450	0.018	0.134	-0.059	-0.174
2	0.171	0.046	-0.348	-0.378	-0.418
3	0.109	0.030	-0.199	-0.197	-0.250
4	0.138	0.002	-0.262	0.116	-0.026
5	0.166	-0.002	-0.301	0.247	0.009
6	0.125	0.004	-0.249	0.198	-0.044
7	0.053	0.005	-0.112	0.162	-0.014

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.419

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.271

DDGDPF

Year	DEFICIT	ΔMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.644	0.051	-0.348	-0.399	-0.916
2	-0.086	0.041	0.643	-0.392	-0.761
3	-0.23 7	0.004	0.212	-0.008	-0.229
4	-0.047	-0.022	-0.409	0.444	0.126
5	0.144	-0.020	-0.566	0.532	0.076
6	0.040	-0.005	-0.166	0.375	-0.049
7	-0.126	-0.005	0.123	0.281	0.057

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.661

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.274

DDGDPT

Year	DEFICIT	ΔMB	%ΔGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.782	0.048	-0.417	-0.440	-0.874
2	-0.056	0.051	0.535	-0.512	-0.873
3	-0.207	0.012	0.260	-0.148	-0.344
4	0.053	-0.016	-0.371	0.334	0.047
5	0.259	-0.017	-0.626	0.463	0.018
6	0.073	-0.002	-0.238	0.323	-0.127
7	-0.176	0.000	0.095	0.230	-0.042

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.390

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.091

Table 9 (continued): Vector Autoregressions—Budget Deficits, the Monetary Base, GDP, Inflation, and Interest Rates

HEDF

Year	DEFICIT	ΔMB	%ΔGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.229	0.016	0.159	0.075	0.114
2	-0.055	0.011	-0.894	-0.072	0.200
3	0.005	0.012	-0.541	0.094	0.236
4	-0.050	0.006	-0.352	0.046	0.068
5	0.070	0.013	0.114	-0.049	-0.059
6	0.061	0.006	0.230	-0.054	-0.030
7	0.077	-0.001	0.109	0.023	0.062

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.180

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.464

HEDT

Year	DEFICIT	AMB	%ΔGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.069	0.030	0.470	-0.183	0.867
2	-0.285	0.057	-2.234	-0.790	0.337
3	0.174	0.031	-0.572	-0.236	0.436
4	0.187	-0.010	-0.027	-0.167	0.332
5	0.144	0.048	0.171	-0.655	-0.221
6	0.162	0.044	0.148	-0.832	-0.497
7	0.241	0.023	0.429	-0.518	-0.327

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.267

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.042

PAHEDF

Year	DEFICIT	ΔMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.287	0.025	0.214	-0.047	0.090
2	-0.286	0.001	-0.856	-0.015	0.344
3	-0.185	0.001	-0.726	0.176	0.339
4	-0.021	0.007	-0.315	0.027	0.011
5	0.155	0.020	0.338	-0.170	-0.188
6	0.150	0.011	0.402	-0.182	-0.110
7	0.099	-0.001	0.127	-0.018	0.065

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.293

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.867

Table 9 (continued): Vector Autoregressions—Budget Deficits, the Monetary Base, GDP, Inflation, and Interest Rates

PAHEDT

Year	DEFICIT	ΔMB	%ΔGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.365	0.069	0.266	-0.579	0.515
2	-0.179	0.036	-1.800	-0.707	0.582
3	0.141	0.005	-0.790	-0.004	0.693
4	0.321	0.003	-0.262	-0.201	0.225
5	0.378	0.059	0.372	-0.803	-0.315
6	0.307	0.042	0.301	-0.889	-0.422
7	0.324	0.018	0.316	-0.485	-0.228

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.457

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.130

KPAHEDF

Year	DEFICIT	AMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.686	0.026	0.252	-0.092	-0.068
2	0.447	0.018	-0.358	-0.092	0.068
3	0.376	0.006	-0.415	0.145	0.210
4	0.343	0.002	-0.426	0.176	0.139
5	0.360	0.010	-0.152	0.091	0.045
6	0.313	0.009	-0.054	0.041	0.059
7	0.269	0.004	-0.071	0.089	0.139

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.304

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.593

KPAHEDT

Year	DEFICIT	AMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	0.637	0.042	0.343	-0.339	0.517
2	0.339	0.030	-1.184	-0.475	0.772
3	0.419	0.008	-0.886	-0.059	1.021
4	0.530	0.014	-0.75 1	-0.282	0.610
5	0.681	0.057	0.007	-0.783	0.088
6	0.651	0.047	0.262	-0.952	-0.106
7	0.629	0.036	0.276	-0.802	-0.126

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.673

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.058

Table 9 (continued): Vector Autoregressions—Budget Deficits, the Monetary Base, GDP, Inflation, and Interest Rates

ELPAHEDF

Year	DEFICIT	ΔMB	%ΔGDP	INF	RSHORT
0	1.000~	0.000	0.000	0.000	0.000
1	-0.448	0.000	0.014	0.001	0.011
2	0.315	0.000	-0.017	0.001	0.010
3	0.190	0.000	-0.006	0.004	0.009
4	-0.413	0.000	0.002	-0.004	0.003
5	0.426	0.000	0.000	-0.009	-0.003
6	-0.043	0.000	0.010	-0.006	-0.001
7	-0.073	0.000	0.000	-0.006	-0.001

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.016

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.542

KLPAHEDT

Year	DEFICIT	AMB	%AGDP	INF	RSHORT
0	1.000	0.000	0.000	0.000	0.000
1	-0.478	0.000	0.012	0.001	0.010
2	0.425	0.000	-0.018	0.000	0.009
3	0.101	0.000	-0.002	0.006	0.011
4	-0.560	0.000	-0.001	-0.002	0.004
5	0.510	0.000	-0.001	-0.007	-0.004
6	-0.224	0.000	0.014	-0.006	-0.001
7	0.054	0.000	0.000	-0.008	-0.003

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with %ΔGDP as dependent variable: 0.038

Significance Level of F-statistic for Deficit Variable (with one and two lags) in equation with INF as dependent variable: 0.448

References

Aschauer, David A. [1989], "Is Public Expenditure Productive?" *Journal of Monetary Economics,* March, 177-200.

Auerbach, Alan J., [1994], "The U. S. Fiscal Problem: Where We Are, How We Got Here and Where We Are Going," *Working Paper #4709,* National Bureau of Economic Research, April.

Barro, Robert J., [1974], "Are Government Bonds Net Wealth?" *Journal of Political Economy,* 1095-1117.

Blinder, Alan S. [1991], "Is the National Debt Really-I Mean, *Really-a* Burden?" in *Debt and the Twin Deficits Debate,* James M. Rock, editor, Mountain View, California, 209-225.

Bureau of Economic Analysis [1994], U.S. Department of Commerce, "Fixed Reproducible Tangible Wealth in the United States: Revised Estimates for 1991-92 and Summary Estimates for 1925-93," *Survey of Current Business,* August, 54-62.

CITIBASE [1978], Citibank economic database [machine-readable magnetic data file], 1946-present, New York, Citibank, N.A.

Congressional Budget Office [1994a], *The Economic and Budget Outlook: Fiscal Years 1995-* 1999, January.

_____ **[1994b],** *The Economic and Budget Outlook: An Update,* August.

Council of Economic Advisors [1994], *Economic Report of the President,* February.

Dornbusch, Rudiger and **Stanley Fischer [19921,** *Macroeconomics,* Sixth Edition, New York.

Eatwell, John [1994], "Citizen Keynes," *The American Prospect,* Winter, 115-124.

Eisner, Robert [1991a], "Deficits and Us and Our Grandchildren," in *Debt and the Twin Deficits Debate,* James M. Rock, editor, Mountain View, California, 81-107.

_____ **[1991b],** "The Real Rate of U.S. National Saving," *Review of Income and Wealth,* March, 13-32.

_____ [**1993],** "Capital Budgeting for Government," Statement for hearings before the House Committee on Government Operations, Legislation and National Security Subcommitee, November 9.

_____ **[1994a], "Real** Government Saving and the Future," *Journal of Economic Behavior and Organization,* 11 **1-** 126.

_____ **[1994b],** *The Misunderstood Economy: What Counts and How to Count It,* Boston.

_____ **[1994c],** "National Saving and Budget Deficits," *Review of Economics and Statistics,* February, 181-186.

_____ and **Paul J. Pieper [1984],** "A New View of the Federal Debt and Budget Deficits," *The American Economic Review,* March, 11-29.

_____ and _____ **[1988],** "Deficits, Monetary Policy, and Real Economic Activity," in *The Economics of Public Debt,* Kenneth Arrow and Michael Boskin, editors, 3-38.

_____ and _____ **[1991],** "National Saving and the Twin Deficits: Myth and Reality," in *The Economics of Saving,* James H. Gapinski, editor, Dordrecht [The Netherlands], 109-133.

_____ and _____ **[1992],** "Real Deficits and Real Growth: a Further View," *Journal of Post Keynesian Economics,* **Fall,** 43-49.

Erenburg, Sharon J. [1994], "Public Capital: The Missing Link Between Investment and Economic Growth," *Public Policy Brief,* **#** 14, The Jerome Levy Economics Institute of Bard College, Annandale-on Hudson, New York.

Evans, Paul and **Georgios Karras [1994],** "Are Government Activities Producitive? Evidence from a Panel of U.S. States," *Review of Economics and Statistics,* February, l-11.

Feldstein, Martin S. [1981], "Government Deficits and Aggregate Demand," *Journal of Monetary Economics, I-20.*

Fischer, Stanley [19931, "The Role of Macroeconomic Factors in Growth," *Journal of Monetary Economics, 485-512.*

Friedman, Benjamin M. [1978], "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits," *Brookings Papers on Economic Activity,* 593-641.

_____ *[* **1988],** *Day of Reckoning: The Consequences of Economic Policy Under Reagan and After, New* York.

_____ **[1991],** "U.S. Fiscal Policy in the 1980s: Consequences of Large Budget Deficits at Full Employment," in *Debt and the Twin Deficits Debate,* James M. Rock, editor, Mountain View, California, 149-172.

Holtz-Eakin, Douglas [1994], "Public Sector Capital and the Productivity

Puzzle," *Review of Economics and Statistics,* February, 12-21.

Kotlikoff, Laurence J. [1992], *Generational Accounting: Knowing Who Pays, and When, for What We Spend, New* York.

Kusko, Andrea L. and **Laura S. Rubin 119931,** "Measuring the Aggregate High-Employment Budget for State and Local Governments," *National Tax Journal,* 411-423.

Leeuw, Frank de and **Thomas M. Holloway [1983],** "Cyclical Adjustment of the Federal Budget and Federal Debt," *Survey of Current Business,* August, 25-40.

McCallum, Bennett T. [1990], "Inflation: Theory and Evidence," in *Handbook of Monetary Economics, Volume II,* Benjamin M. Friedman and Frank H. Hahn, editors, New York, 963-1012.

Munnell, Alicia H. [1990], "How Does Public Infrastructure Affect Regional Economic Performance?" New *England Economic Review,* September/ October, 11-32.

Nadiri, M. Ishaq and **Theofanis P. Mamuneas [1994],** "The Effects of Public Infrastructure and R&D Capital on the Cost Structure and Performance of U.S. Manufacturing Industries," *Review of Economics and Statistics,* February, 22-37.

Nelson, Charles and **Richard Startz [1990],** "The Distribution of the Instrumental Variables Estimator and Its t-ratio When the Instrument is a Poor One," *Journal of Business,* S125-S140.

Pennar, Karen [1993], "Beware of Accounting Magic Tricks, Mr. Clinton," *Business Week,* January 18, 55.

Pinnoi, Nat [1994], "Public Infrastructure and Private Production: Measuring Relative Contributions," *Journal of Economic Behavior and Organization,* Volume 23, 127-148.

Poterba, James and **Lawrence Summers [19921,** "Time Horizons of American Firms: New Evidence From a Survey of C.E.O.'s," in *Capital Choices: Changing the Way America Invests in Industry,* Michael E. Porter, editor, Boston and Washington, June.

Regan, Edward V. [1995], testimony on the proposed Balanced Budget Amendment, before the Senate Judiciary Committee, U.S. Congress, January 5.

Sargent, Thomas J. and **Neil Wallace [1981],** "Some Unpleasant Monetarist Arithmetic," *Federal Reserve Bank of Minneapolis Quarterly Review,* Fall, 1-17.

Seater, John [1985], "Does Government Debt Matter? A Review," *Journal of Monetary Economics,* 121-131.

Vickrey, William [1993], "We Need a Bigger 'Deficit': a Manifesto for a Humane Economics," presented at the Conference "Restoring America's Economic Growth and International Competitiveness," The Jerome Levy Economics Institute of Bard College, Annandale-on-Hudson, November 12-13.

Weiner, Stuart E. [1993], "New Estimates of the Natural Rate of Unemployment," *Economic Review,* Federal Reserve Bank of Kansas City, Fourth Quarter, 53-71.