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PUBLIC DEBT IN THE USA
HOW MUCH, HOW BAD
AND WHO PAYS?

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ABSTRACT

The USA is in the middle of the pack of industrial countries as regards the public debt-GDP and public deficit-GDP ratios. The period since 1980 is the only peace-time period outside the Great Depression to see a sustained increase in the debt-GDP ratio.

The budgetary retrenchment planned by the Clinton administration is likely to prove insufficient to achieve a sustainable path, although the remaining permanent primary (non-interest) gap is small: between 0.1% and 1.0% of GDP. The maximal amount of seigniorage revenue that can be extracted at a constant rate of inflation is not far from the recent historical value of less that 0.5% of GDP.

Subtracting net public sector investment from the conventional budget deficit is likely to overstate the govemment revenue producing potential of public sector investment.

Public debt matters when markets are incomplete and/or lump-sum taxes are restricted. Future interest payments associated with the public debt are not equivalent to currently expected future transfer payments. Even ignoring the distortionary character of most real-world taxes and transfers, and holding constant the government's exhaustive spending program, the "generational accounts" are therefore not a sufficient statistic for the effect on aggregate consumption of the government's tax-transfer program.

Solving the immediate budgetary problems still leaves the much more serious macroeconomic problems of an undersized US Federal government sector and an inadequate US national saving rate.

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I. Introduction.

During the 1992 Presidential election campaign in the USA, the Federal budget deficit became an important political issue. The independent candidate, Mr. Perot, characterized the level and growth rate of the national debt as major threats to the prosperity of the nation, and especially to the well-being of our children. He promised to make the elimination of the deficit his top priority in the field of economic policy. The incumbent President, Mr. Bush, who during eight years as vice-president and four years as President had seen the gross Federal debt held by the public increase from $709 billion at the end of 1980 (26.8% of GDP) to $2,998 billion at the end of 1992 (51.1% of GDP), was on the defensive on the issue throughout the campaign. Governor Clinton's position during the campaign can be characterized as a qualified version of Perot's. He too considered it important that the deficit be brought down, but he did not want to commit himself to immediate measures to do so (and might well take measures that would increase the deficit in the short run) in order not to abort the fledgling recovery.

In this paper I intend to review and evaluate the current budgetary situation in the USA. The purpose is to establish whether, and in what sense, there is a public debt and deficit problem, how important it is and what can be done about it. The plan of the paper is as follows. Section II contains a brief review of the American experience with government debt and deficits, from a historical and comparative international perspective. Section III restates a familiar simple accounting framework for tracing the evolution of the debt over time. This is also a key input into any evaluation of the sustainability of the public sector's fiscal-financial-monetary program and of the magnitude of the fiscal correction required to ensure solvency of the government. Section IV reviews the reasons why public sector debt and deficits may matter for real economic performance. Section V considers a number of issues related to the financing of public sector investment. Section VI concludes.

II. US government debt and deficits in historical and international perspective.

The history of the Federal debt-Gross Domestic Product (GDP) ratio since 1790 is shown in Figure 1. Two facts stand out. First, the current (end of 1991) value of the ratio of gross Federal debt held by the public to GDP is, at 45% percent[1], quite high by historical standards, although still well below the peak value of 107% achieved at the end of World War II. Second,

there have been only two peace-time periods during which the debt-GDP ratio rose for other than normal cyclical reasons.

The first of these is the period 1930-1935; the steep increase in the public debt-GDP ratio during that period can be attributed straightforwardly to the cataclysm of the Great Depression.. The other episode of sustained peace-time growth in the public debt-GDP ratio is the decade of the 1980's, continuing into at least the first few years of the 1990's. Apart from these two episodes, only major wars (the Revolutionary War, the Civil War, World War I and especially World War II) are associated with dramatic increases in the debt-GDP ratio. During peace time the debt-GDP ratio has been amortized by budget surpluses (in the 19th century), by real economic growth (in both centuries) and by inflation (since World War I). When one realizes that a significant part of the increase in the debt-GDP ratio in the early 30's reflected the behavior of the real component of the denominator (real GDP fell by almost 30% between 1929 and 1933), the period since 1980 really stands out as an age of unparalleled peace-time deficits.

Lest an unwarranted sense of confidence in the public debt data overtake one, I present in Figures 2 and 3 some alternative series. While each one shows a significant increase since 1980 in a measure of public sector indebtedness, the levels of the various series differ considerably. The FNFL series in Figure 2 , measuring Federal government net financial liabilities[2], is very close, for the years during which they overlap, to the series for Gross Federal debt held by the public, shown in Figure 1. The GNFL series, constructed on the same basis as FNFL shows how the General government[3] debt-GDP ratio is dominated by the behavior of the Federal government. The FND series of Bohn [1992] , giving the Federal government's net financial debt as a percentage of GNP, has exceeded the FNFL figure by more than 20% of GDP since 1970. The difference is largely accounted for by the accrued pension liabilities of Federal government employees, which amounted to 23% of GDP in 1989.. The current value of Deposit Insurance Guarantees only accounted for 2.9% of GDP in that same year. Note that tangible government assets (reproducible capital and land and mineral rights) are not allowed for in the net debt figure (although financial assets are), and neither are any estimates of the government's implicit "liability" associated with the social security system.

In the analysis of Sections III and IV, the *non-monetary* net financial liabilities of the Federal and General government sectors is what matters. These are shown in Figure 3.

From a contemporary international perspective, the government debt to GDP and deficit to GDP ratios of the USA place it in the middle of the pack of industrial countries. Table 1 shows that at the end of 1992, the General government net debt ranged from 124.3% of GDP for Belgium to -16.6% of GDP for oil-rich Norway. At 37.9%, the US General government was just below the (unweighted) average of 43.6% for the 18 OECD countries shown in Table 1. Again there is a need for caution in interpreting these data, as becomes evident by comparing Tables 1 and Table 2, which presents for the 7 largest OECD countries the ratio of General government *gross* debt to GDP. While in Table 1 general government financial assets are netted out against financial liabilities, Table 2 ignores the financial assets. The difference is quite dramatic, except for Italy and the UK[4]. Table 1 also shows that for 16 out of 18 OECD countries (the exceptions are the UK and the USA), the net debt-GDP ratio was already rising in the second half of the 1970's. The first OPEC oil price shock was the proximate cause of this phenomenon. The rise in the net debt-GDP ratio in the US during the 1980's was shared by all other OECD countries reported in Tables 1 and 2, except for Japan, the UK and Norway.

As regards the government deficit, Table 3 shows that, of the seven largest OECD countries, only the USA and Canada experienced an increase in the deficit-GDP ratio between 1980 and 1990. This cannot be explained in terms of cyclical differences, as the US economy was only just sliding into recession in the second half of 1990. The magnitude of the 1992 US general government deficit, shown to be 4.7% of GDP in Table 4, is large both historically and by current international standards, but between 1.0 and 1.5 percentage points[5] can probably be accounted for by the depressed state of the economy in that year[6]. Table 4 also makes the point that throughout the post-World War II period, the combined State and Local government sector has run a budget surplus. The magnitude of this surplus has, however, shrunk since the middle of the 1980's, probably as a result of President Reagan's reduction in the scope of Revenue Sharing and, more recently, for cyclical reasons. The deficit is clearly a Federal phenomenon, although grants from the Federal government to the State and Local governments exceeded the combined budget surplus of the latter two sectors even during 1991 and 1992.

Note that the net interest paid by the Federal government exceeds that paid by the general government by a considerable amount (0.8% of GDP in 1992). State and local government jointly are net recipients of interest income. The Federal *primary* deficit (the conventional

financial deficit minus net interest paid) is therefore smaller than the General government primary deficit.

Table 5 shows the behavior since 1984 of the General government *primary* balances in the seven largest OECD countries. The primary deficit is the conventional financial deficit minus interest paid and received. It is of interest because, in a way that will be made precise below, when the government is solvent, the existing stock of debt is serviced with future primary surpluses. The 2.5% of GDP General government primary deficit in 1992[7] is after the UK (with a 4.5% of GDP primary deficit) the largest of the seven major OECD countries. All of the OECD was either in full recession during 1992 or just coming out of it (as in the case of the USA).

III. Accounting for the debt.

A simple explicit accounting framework is indispensable for an evaluation of the budgetary position. The key points can be made in the context of a closed economy. Since the US government only borrows by issuing US dollar-denominated debt and the stock of US official international reserve assets is small[8], this simplification does not represent a serious distortion of the US government's accounts. Any quantitative general equilibrium evaluation of the US experience will of course have to allow for its openness to trade, factor movements and financial flows, regardless of the currency denomination of the government's financial portfolio.

In what follows, *government* will refer to the consolidated general government and Federal Reserve System.[9] The following notation is used: M is the nominal stock of base money[10], which bears a zero nominal interest rate; B is the stock of interest-bearing government debt, assumed for simplicity to have a fixed nominal face value and a variable nominal interest rate, i; S is the nominal value of the *primary* budget surplus of the government, that is, its financial surplus minus net interest paid on its debt; P is the general price level; C is the volume of government consumption, A the volume of government gross investment ($A \geq 0$), T the real value of taxes minus transfers and subsidies and K the government real capital stock, valued at current reproduction cost[11]. The flow of sales of public sector capital to the private sector, at a price p^k per unit of privatized capital, is denoted Ω. The gross real rate of return on public sector capital appropriated by the government[12], henceforth its cash real rate of return, is denoted ρ. The

physical depreciation rate of government capital is denoted δ. The budget identity of the government is given in equation (1).

$$\dot{M}(t)+\dot{B}(t)\equiv -S(t)-p^{k}(t)\Omega(t)+i(t)B(t) \tag{1}$$

$$S\equiv P(T+\rho K-C-A) \tag{2}$$

$$\dot{K}=A-\delta K-\Omega \tag{3}$$

Nominal magnitudes are awkward to interpret when the general price level varies, and even for real flows and stocks it is often hard to get a good sense of magnitude when the real economy is growing. It is therefore helpful to rewrite the budget identity in (1) in terms of stocks and flows as proportions of GDP. Let Y denote real GDP. For stocks and flows, a lower case character represents the corresponding upper case character as a proportion of GDP, that is, m≡M/(PY), b≡B/(PY), s≡S/(PY), c≡C/Y, a≡A/Y, τ≡T/Y, ω ≡Ω/Y and k≡K/Y. We also define the instantaneous rate of inflation , $\pi\equiv\dot{P}/P$, the instantaneous growth rate of real GDP, $\gamma\equiv\dot{Y}/Y$, and the instantaneous real rate of interest r≡i-π. The increase in the nominal stock of base money, $\dot{M}$, will be referred to as *seigniorage.* and we define $\Sigma\equiv\dot{M}$ and σ≡Σ/(PY). Changing from money to real GDP as the numeraire, we can rewrite identities (1) , (2) and (3) as follows:

$$\dot{b}\equiv(r-\gamma)b-s-\frac{p^{k}}{p}\omega-\sigma \tag{4}$$

$$s\equiv\tau+\rho k-c-a \tag{5}$$

$$\omega=a-(\gamma+\delta)k-\dot{k} \tag{6}$$

For notational simplicity, we define the *adjusted* primary surplus-GDP ratio, s^{a} , to be the privatization proceeds inclusive primary surplus-GDP ratio:

$$s^a \equiv s + \frac{p^k}{p}\omega \tag{7}$$

The net tangible (that is financial and physical) non-monetary liabilities of the government, D, henceforth referred to as the government's *net* liabilities , are its interest-bearing debt minus the value of its physical assets (at current reproduction cost), that is D≡B-PK and d≡D/(PK)≡b-k. The evolution of the ratio of the government's net liabilities is therefore governed by:

$$\dot{d} \equiv (r-\gamma)d - (\tau - c) + [r - (\rho - \delta)]k + (1 - \frac{p^k}{p})\omega - \sigma \tag{8}$$

The conventional current or consumption account primary surplus of the government as a fraction of GDP, s^c, is defined by

$$s^c \equiv \tau - c \tag{9a}$$

We define the *adjusted* current primary surplus s^{c_a} to be

$$s^{c_a} \equiv s^c - [r - (\rho - \delta)]k + (\frac{p^k}{p} - 1)\omega \tag{9b}$$

The dynamics of the government's net liabilities-GDP ratio can now be written compactly as in equation (10).

$$\dot{d} \equiv (r-\gamma)d - s^{c_a} - \sigma \tag{10}$$

The rate of change of the government's net liabilities-GDP ratio is therefore driven by a first order linear differential equation whose homogeneous part is the product of the existing net liabilities-GDP ratio and the excess of the current real interest rate over the current growth rate of real GDP. The forcing variable is *minus* the sum of the *adjusted current primary* surplus and

government seigniorage (both as fractions of GDP).

While individual administrations may be short-lived, it is not unreasonable to treat the institution of government as effectively infinite-lived[13]. *Assuming that current and future governments do not default on the debt they inherit and/or incur*, the solvency constraint of this infinite-lived institution of government is given in equation (11a) for the budget identity (4) and in equation (11b) for the budget identity (10).

$$\lim_{v\to\infty} b(v)e^{-\int_t^v[r(u)-\gamma(u)]du} \leq 0 \qquad \textbf{(11a)}$$

$$\lim_{v\to\infty} d(v)e^{-\int_t^v[r(u)-\gamma(u)]du} \leq 0 \qquad \textbf{(11b)}$$

What equations (11a,b) assert is that, in the long run, the growth rate of the debt (the net liabilities) must be less than the rate of interest. Ponzi finance is therefore ruled out. Conditions (11a,b) make sense only if the long-run interest rate is not less than the long-run growth rate. If the outstanding stock of public debt (net liabilities) is positive, this then means that "on average" the government will have to run primary surpluses or use seigniorage [14]in the future. While for extended periods of calendar time, ex-post real rates of interest have been negative and well below the rate of growth of the real economy, a world in which such a state of affairs was permanent would be a strange place in which scarcity had, in some fundamental sense, disappeared. If conditions (11a,b) hold, the *present value budget constraint* of the government is as given in (12a) for equation (4) and in (12b) for equation (10).

$$b(t) \leq \lim_{v\to\infty} \int_t^v [s^a(z)+\sigma(z)]e^{-\int_t^v[r(u)-\gamma(u)]du}dz \leq 0 \qquad \textbf{(12a)}$$

$$d(t) \leq \lim_{\nu \to \infty} \int_t^{\nu} [s^{c_a}(z) + \sigma(z)] e^{-\int_t^z [r(u) - \gamma(u)]du} dz \leq 0 \qquad \textbf{(12b)}$$

If, given the outstanding debt and the planned or expected primary surpluses of the government, the inequalities (12a,b) are violated, a good sense of the *permanent fiscal correction*, as a proportion of GDP, that will be required if debt repudiation or default is to be avoided, is given by the *permanent primary gaps* g^b_t and g^d_t, defined in (13a,b) (see Buiter [1983, 1985], Blanchard [1990] and Blanchard, Chouraqui, Hagemann and Sartor [1990])

$$g_t^b \equiv \lim_{\nu \to \infty} \left[\int_t^{\nu} e^{-\int_t^z [r(u) - \gamma(u)]du} dz \right]^{-1} \left[b(t) - \lim_{\nu \to \infty} \int_t^{\nu} [s^{a}(v) + \sigma(v)] e^{-\int_t^v [r(u) - \gamma(u)]du} dz \right] \qquad \textbf{(13a)}$$

$$g_t^d \equiv \lim_{\nu \to \infty} \left[\int_t^{\nu} e^{-\int_t^z [r(u) - \gamma(u)]du} dz \right]^{-1} \left[d(t) - \lim_{\nu \to \infty} \int_t^{\nu} [s^{c_a}(v) + \sigma(v)] e^{-\int_t^v [r(u) - \gamma(u)]du} dz \right] \qquad \textbf{(13b)}$$

The term $\lim_{\nu \to \infty} \left[\int_t^{\nu} e^{-\int_t^z [r(u) - \gamma(u)]du} dz \right]^{-1}$ is the long-run real rate of interest, r, minus the long-run growth rate of real GDP, γ.

The term $\lim_{\nu \to \infty} \left[\int_t^{\nu} e^{-\int_t^z [r(u) - \gamma(u)]du} dz \right]^{-1} \lim_{\nu \to \infty} \int_t^{\nu} [s^{a}(v) + \sigma(v)] e^{-\int_t^v [r(u) - \gamma(u)]du} d$ is that *constant* value of the

primary surplus plus seigniorage as a proportion of GDP, $\underline{s_t^a + \sigma_t}$, say, whose present discounted value is the same as the present discounted value of the sequence of primary surpluses plus seigniorage as proportions of GDP that are actually expected or planned to prevail in the future. We shall refer to this as the *planned* permanent primary surplus plus seigniorage to GDP ratio. The term $(r-\gamma)b(t)$ *or* $(r-\gamma)d(t)$ will be referred to as the *required* permanent primary surplus plus seigniorage to GDP ratio. Equations (13a,b) can therefore be rewritten rather more transparently as equations (14ab): the permanent primary gap is the excess of the required over the planned permanent primary surplus plus seigniorage to GDP ratio.

$$g_t^b \equiv (r-\gamma)b(t) - \underline{(s_t^a + \sigma_t)} \qquad \textbf{(14a)}$$

$$g_t^d \equiv (r-\gamma)d(t) - \underline{(s_t^{c_a} + \sigma_t)} \qquad \textbf{(14b)}$$

IV. Why care about the public debt?

There are four reasons why the public debt matters for real economic performance. The first is the argument that a larger stock of public debt makes default or debt repudiation more likely. The second is the proposition, most recently associated with Sargent and Wallace [1981], that a larger debt and/or a larger deficit imply eventually higher monetary growth and inflation. The third is the old argument that deficit financing leads to "financial crowding out". It reduces national saving and thus domestic capital formation and/or net foreign investment. The fourth argument points to reasons why the ability of governments run unbalanced budgets may be useful. There is a Keynesian variant, stressing the stabilizing properties of countercyclical fiscal deficits and a new classical variant which extols the virtues of tax (rate) smoothing in the face of temporary variations the tax base or in public expenditures when all available tax instruments are distortionary. We shall deal with them in turn.

IV.1 Government debt default and the permanent primary gap.

Except in countries where the vast majority of the population lives on the edge of

starvation, government debt default is always a policy *choice*, rather than something forced on a powerless government by unfavorable circumstances that leave it no other option. In other words, the decision to default generally reflects willingness to pay rather than ability to pay. There is of course an upper bound on the magnitude of the primary surpluses even the most ruthless and efficient government can squeeze out of its tax payers and out of the beneficiaries from its spending programs, without seriously endangering its chances for political survival. At that point the distinction between willingness to pay and ability to pay ceases to be very meaningful.

The government has many instruments at its disposal for influencing the real value of its debt, other than *de jure* repudiation or a formal capital levy on government debt holders. With long-maturity nominal debt, an unexpected increase in long nominal interest rates (brought about, say, by the unanticipated adoption of more inflationary current and anticipated future policies) will cause an unexpected decline in the real market value of the debt, even absent any default risk. Long real interest rates too can be influenced by current and anticipated future government policies[15]. Unexpected increases in the taxation of interest income or capital gains can also be used to inflict capital losses on government debt holders. Even here, however, the political consensus is unlikely to tolerate wild experiments.

While *de jure or de facto* default has been and continues to be an important policy issue in many developing countries, the political cost-benefit calculus of formal debt repudiation in the USA is extremely unfavorable to this option. It would not be politically survivable. In addition, the permanent fiscal correction required to guarantee solvency is, as shown below, rather small.

We can use equations (14a,b) to make some back-of-the-envelope calculations about the minimal permanent increase in the primary surplus-GDP ratio (plus the seigniorage-GDP ratio) that is required to make the US budgetary position sustainable, in the sense of consistent with government solvency. Solvency of course only relates to the feasibility rather than to the optimality of budgetary policies, but even feasibility is not something to be sneezed at when the extrapolation of current patterns of behavior of public spending and revenue raising suggests you haven't got it.

To calculate the permanent primary gap for the US Federal or General government, we need the following inputs: (1) an estimate of the excess of the long-run rate of interest over the

long-run growth rate of GDP, $r - \gamma$; (2) the initial debt-GDP ratio (b(t) or d(t)) and (3) an estimate of the planned or expected permanent primary deficit plus seigniorage (as a proportion of GDP), $\underline{s_t^c + \sigma_t}$, or $\underline{s_t^{c_a} + \sigma_t}$

The long-run interest rate and growth rate.

It is apparent from Figure 4 that the historical relationship between nominal interest rates on the public debt and the ex-post growth rate of nominal GDP has not been a constant one in the 40 years since the Korean War. Table 6 confirms this. The growth rate of nominal GNP exceeds both the short and the long nominal interest rates on Federal government debt until the end of the 1970's. Since 1980, the average short rate has exceeded the average growth rate of nominal GDP by 1.12 percentage points per annum. For the long rate, the excess has been 3.03 percentage points per annum.

It is hard to be confident about any prediction concerning the relationship between interest rates and growth rates in the future. I would be inclined to take the post-1980 observations as a better guide to the future than the earlier ones. This reflects my view that both the high real growth rates and the low real interest rates of the first thirty-plus years following World War II were exceptional and are most unlikely to be repeated. Unless a major lasting recession intervenes, the coming decades are likely to be characterized by low global saving propensities and ambitious global investment plans. High real interest rates would be the equilibrium outcome. In any case, since the cost associated with over-estimating $r - \gamma$ are likely to be lower than the cost of underestimating it, I believe that prudence calls for working with a one or two percentage points per annum number for $r - \gamma$.

The economic assumptions made by the Clinton Administration (A Vision of Change for America [1993, Table 3-2]) are reproduced below in Table 7. For the next 6 years the short nominal interest rate is assumed to be on average 1.15% below the growth rate of nominal GDP while the long rate of interest is assumed to be on average 0.8% above the growth rate of nominal GDP. All three series are likely to prove to be too low; in addition, the assumed relationship between the 3-month US Treasury Bill rate and the growth rate of nominal GDP represents either a pious hope or the unwarranted extrapolation of an unsustainably low US short

term interest rate at the beginning of an economic recovery. Note that the actual interest payments made in the next few years on the public debt are to a large extent predetermined by the existing maturity structure of the debt. With an average maturity of just under six years, the US Federal debt might seem a natural candidate for a major open market operation, retiring long-dated debt and replacing it with short-dated instruments. Whether such a debt conversion can be implemented on a voluntary basis at anything like the current short-long yield differentials is an open question.

The initial debt-GDP ratio.

I shall use two benchmark figures for the initial debt-GDP ratio. The first is 65% of annual GDP at the end of 1992 for the non-monetary net debt of the Federal government, including the present value of accrued pension obligations to Federal employees. As can be seen from Figure 2, this ratio was just below 60% of GDP at the end of 1989, and rising. The second is 45% of annual GDP at the end of 1992 for general government net non-monetary debt, excluding the present value of accrued pension obligations to Federal, State and Local government employees. At the end of 1991, this stood at 42.6% of GDP.

The required permanent primary surplus.

If the excess of the long-run interest rate over the long-run growth rate is as much as 2 percentage points per annum (which may well be generous since it is the *after-tax* rate of interest that matters), then in order to achieve solvency, the consolidated US Federal government sector and central bank (henceforth the Federal government) needs to run a permanent primary surplus plus seigniorage of no less than 1.3% of GDP. Assuming (perhaps somewhat conservatively, since in 1991 seigniorage was 0.42% of GDP) a permanent share of seigniorage in GDP of 0.25%, the required permanent Federal government primary surplus is 1.05% of GDP.

If the excess of the long-run interest rate over the long-run growth rate is only 1% per annum, the required permanent Federal government primary surplus plus seigniorage goes down to 0.65% of GDP and the required permanent Federal government primary surplus to 0.40% of GDP[16] If the long-run interest rate equals the long-run growth rate, the required Federal permanent primary surplus plus seigniorage goes down to zero, and the required permanent

primary surplus is -0.25% of GDP. Table 8a summarizes these assumptions and calculations.

Note that these are the minimal permanent primary surpluses required for solvency. Other considerations (such as the wish to avoid financial crowding out) may motivate a larger permanent primary surplus.

As regards the general government, the required permanent primary surplus plus seigniorage equals 0.90% of GDP when the excess of the long-run interest rate over the long-run growth rate is two percent per annum, 0.45% of GDP when the excess is one percent per annum and zero when the long-run interest rate equals the long-run growth rate. The assumptions and calculations for this case are summarized in Table 8b.

Note that the initial Federal government debt-GDP ratio of 65% (but not the initial General government debt-GDP ratio of 45%) includes the present discounted value of accrued Federal employee pension rights. Following Bohn [1992], the correct measure for current outlays under accrual accounting for pension liabilities is the value of newly-accruing pension obligations rather than the current payments to beneficiaries. Bohn goes on to show that, since the early seventies, pension outlays to current beneficiaries have exceeded newly-accruing liabilities.[17] The last year for which Bohn provides a "pension outlays correction" is 1989; it adds $30.9 billion to the conventionally measured primary surplus, that is, 0.60% of the 1989 GDP. In the absence of more up-to-date information, I apply the same 0.60% of GDP as the appropriate "pension outlays correction" in 1992.

The planned permanent primary surplus and the primary gap.

Rather than attempting the impossible by estimating the present discounted value of the infinite sequence of all future planned primary surpluses, I shall merely attempt to purge the current primary surplus of its cyclical component.

The 1992 general government primary surplus of -2.5% of GDP (according to the OECD[1992] estimate;-2.1% of GDP according to the OMB [1993] estimate), was generated by an economy that is still operating significantly below capacity. If a return to normal capacity utilization is possible *without additional discretionary fiscal measures that would further raise the deficit*, then the current primary deficit overstates the long-run average primary deficit under unchanged fiscal policy. The OECD estimates that the cyclically adjusted primary deficit of the

General government increased by only 0.2% of GDP in 1991 and by 0.4% of GDP in 1992 [18]. Table 5 shows that the OECD measure of the actual General government primary deficit increased by 0.7% of GDP in 1991 and 1.4% of GDP in 1992. If 1990 is a year for which no cyclical correction is required, then the cyclically corrected General government primary deficit in 1992 was 1.0% of GDP.

Identifying the planned permanent primary surplus with the cyclically corrected current primary surplus of 1992 gives us, for the General government, the permanent primary gaps shown in lines (10) and (11) of Table 8b. They range from a low of 0.35% of GDP (when the long-run interest rate equals the long-run growth rate and the lower OMB[1993] figure for the 1992 actual General government primary deficit is used) to a high of 1.65% of GDP (when the long-run interest rate is two percentage points higher than the long-run growth rate and the higher OECD[1992] figure for the actual 1992 General government primary deficit is used)[19].

Another way of looking at these figures is to note that the long-run real interest rate would have to be 1.15% *below* the long-run growth rate in order for the permanent primary gap to vanish when the OECD estimate of the current primary surplus is used. When the OMB estimate of the current primary deficit is used the long-run interest rate must be 0.53% below the long-run growth rate for the permanent primary gap to equal zero. These estimates of required permanent corrections are not negligible, but neither do they seem to be the stuff out of which crises ought to be made in a country as affluent as the USA.

As regards the Federal government, the 1992 actual primary deficit was 1.5% of GDP. If the entire 1.5% of GDP cyclical correction for the general government is attributed to the Federal government (a likely overestimate of the Federal cyclical correction), then the 1992 cyclically corrected Federal non-interest budget would have been balanced. In addition, as noted earlier, the Federal debt figure includes an estimate of accrued Federal employee pension rights based on Bohn [1992][20]. The associated correction to the pension outlays in the primary balance is assumed to raise the primary surplus by 0.60% of GDP in 1992. Table 8a shows the Federal permanent primary gap to be -0.86% of GDP when $r-\gamma$ equals 0%, -0.21% of GDP when $r-\gamma$ equals 1% and 0.44% of GDP when $r-\gamma$ equals 2%.

Bohm's calculations of the present discounted value of accrued pension rights and of the current pension outlays correction did, inevitably, require a number of fairly arbitrary assumptions

to be made. In addition, my "adjustments" of his 1989 data to get figures for 1992 were extremely simplistic. The Federal permanent primary gap calculations in Table 8a should therefore be treated with caution.

As inspection of the bottom line of Table 9 below indicates, the recent budgetary proposals submitted by the Clinton administration contain planned Federal deficit reductions that are insufficient to produce a sustainable debt-deficit path if we go by the General government calculations of Table 8b. By this I mean that if the average cyclically corrected primary surplus planned for the Federal government for the period 1993-98 (equal to 0.13% of GDP, using the last line of Table 9) were to be maintained *indefinitely* and if the 1992 value of the State and Local government primary surplus (equal to -0.5% of GDP according to Table 4) were to be maintained *indefinitely*, then the General government's solvency constraint would not be satisfied. The planned permanent General government primary surplus under the Clinton budget proposal would be -0.37% of GDP. Comparing this with line 5 of Table 8b yields a planned permanent primary gap for the General government of between 0.12% of GDP (when $r-\gamma$ equals 0 and 1.02% of GDP (when $r-\gamma$ equals 2%). According to these calculations, the Clinton proposals do not yet constitute a sustainable policy. Sooner or later, further tax increases or spending cuts are required merely to ensure government solvency.

If we take the Federal government calculations of Table 8a as our point of departure, the picture looks rather rosier for the Clinton proposals. With a planned average cyclically corrected Federal primary surplus for the period 1993-1998 of 0.13% of GDP, the permanent Federal Primary gap would be -0.98% of GDP when $r-\gamma$ equals 0, -0.33% of GDP when $r-\gamma$ equals 1% and 0.32% of GDP when $r-\gamma$ equals 2%. Again a larger pinch of salt should be applied to this calculation than to the one for the General government.

Three final remarks on these permanent primary gap calculations. First, the method is silent on the nature of the fiscal measures that should be taken to eliminate the gap; it only gives the *sum* of the required spending cuts, tax increases and increased recourse to seigniorage. Second, the method has nothing to say about the timing of the fiscal corrections. At one extreme, one could reduce the planned primary deficit immediately and at each future date by the amount of the permanent primary gap. This would mean an immediate fiscal contraction that could threaten the recovery unless a compensating relaxation of monetary policy or an (unlikely)

boost to demand from the rest of the world were forthcoming. At the other extreme are the proposals of those who for cyclical reasons propose immediate discretionary measures to stimulate the economy. Their immediate impact would be to increase the fiscal deficit. Following such an initial fiscal stimulus, the future permanent correction would of course need to be larger that the one just calculated, since more the debt-GDP ratio will probably be rising while the fiscal stimulus is in effect.

Finally, the cyclically corrected primary surplus may be a very poor indicator of the long-run average primary surplus if non-cyclical, structural changes in current outlays and receipts can be anticipated. Demographic changes that alter the balance of inflows and outflows of the social security budget are an obvious example. Contingent implicit liabilities arising from the precarious state of part of the financial system are another. Perhaps even more important in the US context is the expected growth, under current laws, regulations and practice, of Federal outlays for Medicare and Medicaid.

IV.2 Debt, deficits and inflation.

There is an upper bound on the real resources the government can appropriate through seigniorage. Consider equation (15) which rewrites σ, seigniorage as a fraction of GDP in a number of ways. $\mu \equiv \frac{\dot{M}}{M}$ is the proportional rate of growth of the nominal stock of base money.

$$\begin{aligned} \sigma &\equiv \dot{M}/(PY) \\ &\equiv \dot{m} + (\pi + \gamma)m \\ &\equiv \mu m \end{aligned} \qquad (15)$$

Sooner or later , a sustained higher rate of monetary growth μ will lead to higher inflation. A higher (expected) rate of inflation will tend to reduce the demand for real money balances, both directly and by raising nominal interest rates and the expected rate of depreciation of the domestic currency. Thus when the long-run expected value of μ (*the inflation tax rate*) is raised, m, (*the inflation tax base)*, will tend to decline. There is reasonably strong empirical evidence

that there is a long-run "seigniorage Laffer curve": at high rates of inflation, the (negative) elasticity of money demand with respect to the rate of inflation becomes greater than one in absolute value, and further increases in the rates of monetary growth and inflation will actually reduce real seigniorage revenue.

In the USA today, seigniorage is a negligible source of government revenue, as Figure 3 makes clear. The base money stock is less than 6% of annual GDP since 1975 (an annual income velocity of circulation of base money of almost 17). The change in the nominal stock of base money has not exceeded 0.5% of GDP since 1960.

In what sense do higher deficits or a larger debt imply higher inflation? From equation (8), the proportional rate of growth of the monetary base μ, is given by

$$\mu \equiv V[-s^c+[r-(\rho-\delta)]k+(1-\frac{p^k}{p})\omega+(r-\gamma)d-\dot{d}] \qquad (16)$$

where $V \equiv PY/M$ is the income velocity of circulation of base money. Consider a long-run stationary equilibrium with the net debt-GDP ratio constant at $\underline{d}$, a constant rate of inflation $\underline{\pi}$ and constant values of p^k/p and of ω. The public sector capital stock-GDP ratio is also constant at $\underline{k}$. While the short-run relationship between the rate of growth of any monetary aggregate and the rate of inflation remains one of economics' best kept mysteries, it is not unreasonable to postulate that the long-run rate of inflation equals the long-run growth rate of base money, $\underline{\mu}$, minus the long-run growth rate of GDP, $\underline{\gamma}$. This implies

$$\underline{\pi}=\underline{V}[-\underline{s}^c+(\underline{r}-(\underline{\rho}-\delta))\underline{k}+(1-\frac{p^k}{p})\underline{\omega}+(\underline{r}-\underline{\gamma})\underline{d}]-\underline{\gamma} \qquad (17)$$

If we are willing to assume that the long-run real interest rate and the long-run growth rate of real GDP are independent of the rates of monetary growth and inflation (the traditional monetarist or classical position), then it is clear from (17) that the deficit concept that drives long-run monetary growth and inflation is rather different from the conventional government deficit-GDP ratio. Holding constant velocity, the deficit that governs long-run monetary growth is the government's ***inflation-and-real-growth-corrected adjusted current deficit*** as a fraction of GDP. The interest rate applied to the *net* debt of the government (the capital stock valued at current

reproduction cost is subtracted from the government's interest-bearing liabilities) is the real interest rate minus the growth rate of real GDP, a number certain to be much lower than the nominal interest rate that figures in the conventional government deficit.

If the net cash rate of return to the government on the public sector capital stock is the same as the real rate of interest ($\rho-\delta=r$) and the privatization value of public sector capital equals its current reproduction cost ($p^k= p$), then the only other item in the corrected deficit is the *current primary deficit* as a fraction of GDP, $-s^c \equiv c-\tau$. It is, however, useful to look at other, possibly more realistic benchmark cases.

Consider, e.g. the case where $\rho = 0$, and $p^k = 0$, that is, the government does not get any gross cash income, directly or indirectly, from the operation of its capital stock in the public sector and public sector capital has no value outside the public sector. In that case equation (17) becomes

$$\pi = \dot{M}[-s^c + g + (r-\gamma)b] - \gamma \qquad (18)$$

Note that the deficit concept driving long-run inflation (given velocity), $-s^c + g + (r-\gamma)b$, is, except for the inflation and real growth corrections, much more like the conventional government financial deficit. The inflation-and-real-growth-corrected interest rate is now applied to the government's stock of interest-bearing liabilities. The government capital stock is no longer subtracted from its debt. The appropriate primary deficit is no longer the current primary deficit, $-s^c$, but the conventional primary deficit inclusive of gross domestic capital formation by the government, $-s \equiv -s^c + a$.

At the beginning of this subsection, there was an allusion to the fact that the velocity of circulation of base money is likely to be an increasing function of the expected rate of inflation. Equating actual and expected inflation in steady state, equation (17) and the velocity function can be used as a rudimentary model of the long-run relationship between the budget and the rate of inflation (see e.g. Anand and van Wijnbergen [1989] and Buiter [1990]).

The post-1959 American data suggest that it is actually impossible to raise *the steady-state* seigniorage revenue GNP ratio much above its current (presumably non-steady state) paltry level. This can be illustrated empirically as follows. I estimated a base money demand function in error-

correction form, as shown in equation (19)

$$\Delta \ln(M/P) = \alpha_0 + \sum_{i=1}^{3} \delta_i + \alpha_1 time + \alpha_2 \ln(M/P)_{-1} + \alpha_3 \ln Y_{-1} + \alpha_4 E\pi_{-1} + \alpha_5 i_{-1} + \epsilon \qquad (19)$$

M is the FRB's series for the monetary base corrected for changes in reserve requirements; P is the GNP deflator, Y real GNP, i the three month US Treasury Bill Rate in the secondary market and π the proportional rate of change of the GNP deflator[21]. The δ_i are quarterly dummies and E is the conditional expectation operator.

The time trend was not significantly different from zero (α_1=0). For estimation purposes, the actual rate of inflation was substituted for the unobservable expected rate of inflation. Under rational expectations, this creates an errors-in-variables problem, requiring the use of instrumental variable estimation. For instruments I used the constant term, seasonal dummies and trend, all regressors other than inflation, inflation lagged one and two quarters and the lagged value of the Discount Rate of the Federal Reserve Bank of New York. The results are reported below as equation (20) (the quarterly dummies are omitted). T-statistics are given below the estimated values of the coefficients.

****

Sample range: 1959.4 -1992.1

$$\Delta \ln(M/P) = \underset{(0.851)}{0.0257} - \underset{(4.358)}{0.0630} \ln(M/P) + \underset{(6.419)}{0.0527} \ln Y_{-1} - \underset{(5.868)}{0.7427} \pi_{-1} - \underset{(5.038)}{0.7330} i_{-1} \qquad (20)$$

R^2: 0.92
Adjusted R^2: 0.92
S.E. of regression: 0.0060
F-statistic: 208.23
Durbin-Watson statistic: 1.74

****

The restriction that the value of the coefficient on $\ln(M/P)_{-1}$ equals minus the value of the coefficient on $\ln Y_{-1}$, was not rejected by the data. Imposing the restriction that $\alpha_2 + \alpha_3 = 0$, equation (21) was estimated (also using instrumental variables).

****

Sample range: 1959.4 -1992.1

$$\Delta \ln(M/P) = -0.0174 - 0.0434[\ln(M/P) - \ln Y]_{-1} - 0.7442\pi_{-1} - 0.6265 i_{-1} \quad (21)$$
$$(2.893)\quad (8.458)\qquad\qquad (5.817)\quad (4.605)$$

R^2: 0.92
Adjusted R^2: 0.92
S.E. of regression: 0.0060
F-statistic: 240.36
Durbin-Watson statistic: 1.75

****

In steady state the growth rate of real money balances equals the growth rate of real GDP, that is, $\Delta \ln(M/P) = \gamma$. Equating the actual and expected rates of inflation and noting that $i \equiv r + \pi$, the long-run base money demand function can be written as in equation (22).

$$\frac{M}{PY} = e^{[\alpha_2^{-1}(\gamma - \alpha_0 - \alpha_3 r) - \alpha_2^{-1}(\alpha_4 + \alpha_5)\pi]} \quad (22)$$

In steady state, $\mu = \gamma + \pi$, so steady-state seigniorage can be written as

$$\sigma = (\pi + \gamma)M/(PY)$$

The steady-state seigniorage maximizing rate of inflation π^m is given by:

$$\pi^m = \frac{\alpha_2}{\alpha_4 + \alpha_5} - \gamma = 0.0317 - \gamma$$

The inflation rate is a quarterly rate, so the annual rate of inflation that maximizes the long-run share of seigniorage in GDP is approximately 12.7 percent minus the long-run annual growth rate of real GDP. If we take the long-run annual growth rate of real output to be 3 percent per annum, then the steady-state seigniorage revenue maximizing quarterly rate of inflation is 0.024 or just under 2.5 percent per quarter (9.7 percent per annum). Assuming the long-run real interest rate to be 4 percent per annum (.01 per quarter), the maximal share of quarterly GNP that can be extracted as seigniorage in steady state, σ^m, is then given by $\sigma^m = 0.0072$ or 0.72 percent of quarterly GNP. The steady-state seigniorage revenue maximizing ratio of base money to quarterly GNP is 22.7 percent of GNP (a base money-annual GNP ratio of 5.7%).

These low numbers, which as regards seigniorage and the base money-GNP ratio are not

too far from recent historical experience, are a reflection of the fact that the estimate of the semi-elasticity of the long-run demand for real money balances with respect to the annual rate of inflation, $-\frac{1}{4}\alpha_2^{-1}(\alpha_4+\alpha_5)$, is -7.9. This very large numerical value ensures that the highest point of the long-run seigniorage Laffer curve is reached at a low rate of inflation and at low values of the share of seigniorage in GNP.

These estimates of the semi-elasticity of long-run money demand with respect to the annual inflation rate are much higher than those typically obtained for other countries, both industrial and developing, for which semi-elasticities of -2.0 , -1.5 or less have been recorded (see e.g. Buiter [1985]). To make sure that improperly accounted for seasonality did not produce spurious results, I re-estimated the identical specifications of the base money demand functions using annual data. The unrestricted and restricted annual base money demand functions are as given in equations (20') and (21'). Note that the inflation rate and the interest rates here are annualized rates and that the GNP flow is annual too.

****

Sample range: 1960-1991

$$\Delta \ln(M/P) = -0.1216 - 0.2598 \ln(M/P)_{-1} + 0.1950 \ln Y_{-1} - 0.7470 \pi_{-1} - 0.5122 i_{-1} \qquad (20')$$
$$(1.101)\quad (3.112)\qquad (3.867)\qquad (6.063)\quad (2.770)$$

R^2: 0.76
Adjusted R^2: 0.72
S.E. of regression: 0.0126
F-statistic: 14.568
Durbin-Watson statistic: 2.04
****

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Sample range: 1960-1991

$$\Delta \ln(M/P) = -0.2692 - 0.1214[\ln(M/P) - \ln Y_{-1}] - 0.6590\pi_{-1} - 0.3614 i_{-1} \qquad (21')$$
$$(3.457)\ (4.011) \qquad\qquad (4.589)\ \ (2.155)$$

R^2: 0.71
Adjusted R^2: 0.68
S.E. of regression: 0.0135
F-statistic: 12.92
Durbin-Watson statistic: 2.09

****

The relationship between the quarterly and the annual estimates is as follows. Let $m_t = \ln M_t$, $p_t = \ln P_t$ and $y_t = \ln Y_t$ where t indexes quarters. Assume the "primitive" behavioral relationship is in terms of quarterly time units, as given in equation (23).

$$m_t - p_t - (m_{t-1} - p_{t-1}) = \alpha_0 + \alpha_2(m_{t-1} - p_{t-1}) + \alpha_3 y_{t-1} + \alpha_4 \pi_{t-1} + \alpha_5 i_{t-1} + \epsilon_t \qquad (23)$$

Recursive substitution using equation (23) yields (24).

$$m_t - p_t - (m_{t-4} - p_{t-4}) = \alpha_0 \sum_{i=0}^{3} (1+\alpha_2)^i + [(1+\alpha_2)^4 - 1](m_{t-4} - p_{t-4}) + \alpha_3 \sum_{i=0}^{3} (1+\alpha_2)^i y_{t-1-i} \qquad (24)$$
$$+ \alpha_4 \sum_{i=0}^{3} (1+\alpha_2)^i \pi_{t-1-i} + \alpha_5 \sum_{i=0}^{3} (1+\alpha_2)^i i_{t-1-i} + \sum_{i=0}^{3} (1+\alpha_2)^i \epsilon_{t-1-i}$$

The annual money stock data I use (from the Economic Report of the President [1993]) are daily averages. m_t is just the daily average for the t^{th} quarter. Similarly, the annual real money stock for the year ending in period t is obtained by deflating the annual average nominal money stock by the average price level of the year ending in quarter t. p_t is just the price level in the t^{th} quarter. Let m_t^a, the logarithm of the average nominal base money stock in the year ending in quarter t, be the arithmetic average of the logarithm of the nominal base money stocks of the 4 quarters ending in quarter t. Also let p_t^a, the logarithm of the average price level in the year ending in quarter t be the arithmetic average of the logarithm of the price levels in the four

quarters ending in quarter t. Assume the proportional quarterly rate of growth of nominal base money during each of the 4 quarters of the year ending in quarter t is constant at μ_t, that is, $m_{t-i} = m_{t-i-1} + \mu_t$, i = 0,..,3. Assume likewise that the proportional quarterly rate of inflation during each of the 4 quarters of the year ending in quarter t is constant at π_t, that is $p_{t-i} = p_{t-i-1} + \pi_t$, i = 0,..3. Finally assume that real output during the 4 quarters ending in quarter t grows at the constant quarterly rate γ_t and that the quarterly nominal interest rate during the 4 quarters ending in quarter t is constant at i_t. Real output during the year ending in quarter t is denoted y_t^a, the (annual) nominal interest rate during the year ending in quarter t is denoted i_t^a and the (annual) inflation rate during the year ending in quarter t is denoted π_t^a. It follows that

$$m_t^a = m_t - \frac{3}{2}\mu_t$$
$$p_t^a = p_t - \frac{3}{2}\pi_t$$
$$y_t^a = 4y_t - 6\gamma_t$$
$$i_t^a = 4i_t$$
$$\pi_t^a = 4\pi_t$$

The annual change in the logarithm of the real base money stock implied by the quarterly model of equation (23) is given in equations (25) and (26a through f)

$$m_t^a - p_t^a - (m_{t-4}^a - p_{t-4}^a) = \alpha_0^a + \alpha_2^a(m_{t-4}^a - p_{t-4}^a) + \alpha_3^a y_{t-4}^a + \alpha_4^a \pi_{t-4}^a + \alpha_5^a i_{t-4}^a + \epsilon_t^a \quad (25)$$

$$\alpha_0^a = \alpha_0 \sum_{i=0}^{3} (1+\alpha_2)^i \quad (26a)$$

$$\alpha_2^a = (1+\alpha_2)^4 - 1 \quad (26b)$$

$$\alpha_3^a=\frac{\alpha_3}{4}\sum_{l=0}^{3}(1+\alpha_2)^l \tag{26c}$$

$$\alpha_4^a=\frac{\alpha_4}{4}\sum_{l=0}^{3}(1+\alpha_2)^l \tag{26d}$$

$$\alpha_5^a=\frac{\alpha_5}{4}\sum_{l=0}^{3}(1+\alpha_2)^l \tag{26e}$$

$$\begin{aligned}\epsilon_t^a=&\sum_{l=0}^{3}(1+\alpha_2)^l\epsilon_{t-1-l}-\frac{3}{2}[\mu_t-\pi_t-(1+\alpha_2)^4(\mu_{t-4}-\pi_{t-4})]\\&+\sum_{l=0}^{2}(1+\alpha_2)^l[\alpha_3(3-l)(\gamma_t-\gamma_{t-4})+\alpha_4(\pi_t-\pi_{t-4})+\alpha_5(i_t-i_{t-4})]\\&+\alpha_3[\frac{3}{2}\sum_{l=0}^{3}(1+\alpha_2)^l+\sum_{l=0}^{2}(1+\alpha_2)^l(3-l)]\gamma_{t-4}\end{aligned} \tag{26f}$$

Even if the error terms in equations (23) and (25) have been handled properly for estimation and hypothesis testing, the α_i^a coefficients in (25) will not, in general, be the same as (or even close to) the α_i coefficients in (23). It so happens that for the values of the α_i coefficients estimated using the quarterly equations (20) and (21), the α_i^a coefficients are rather similar to the corresponding α_i coefficients. (Note that the closer α_2 is to zero, the closer α_i^a is to α_i, with strict equality when $\alpha_2 = 0$).

For instance, if α_2 = -0.0630 (as in the quarterly equation (20)), then $(1+\alpha_2)^4-1=-0.2292$ and $\sum_{l=0}^{3}(1+\alpha_2)^l=3.638$. The value of α_2^a expected on the basis of α_2 = -0.0630 is therefore -0.2292, close to the estimate in equation (20') of -0.2598. Similarly the value of α_3^a expected on the basis of the quarterly estimates of α_2 and α_3 is 0.0479 (against an estimate based on annual data of 0.1950); the expected value of α_4^a is -0.6755 (against an estimate of -0.7470; the expected

value of α_5^a is o.6667 (against an estimate of -0.5122); the expected value of the annual constant term α_0^a, is 0.0935 (against an estimate of -0.1216). However, if ε_t is white noise, there is no reason to believe that ϵ_t^a should have a zero mean, so the estimated constant term in a regression with annual data need not be a consistent estimate of α_0^a.

If $\alpha_2 = -\alpha_3 = -0.0434$ (as in the quarterly equation (21)), then α_2^a in the annual equation (18'), should equal -0.1626. The point estimate of α_2^a in (21') is in fact -0.1214, which is not significantly different from -0.1626. For $\alpha_2 = -0.0434$, $\sum_{i=0}^{3}(1+\alpha_2)^i = 3.747$, making for theoretically expected values of the α_i^a that are (with the exception of the constant term) even closer to the corresponding α_i. When $\alpha_2 = -0.5$, $\alpha_2^a = -0.9375$, and $\sum_{i=0}^{3}(1+\alpha_2)^i = 1.87$. In this case the theoretically expected values of the α_i^a , $i=3,4,5$ are less that half of the corresponding α_i. Note also that even if $\alpha_2 = -\alpha_3$, it will only be approximately true that $\alpha_2^a = -\alpha_3^a$ for values of α_2 close to zero. The restriction that $\alpha_2^a = -\alpha_3^a$ is in fact rejected by the annual data at standard significance levels, even though the restriction $\alpha_2 = -\alpha_3$ is not rejected by the quarterly data.

The value of α_2 implied by the estimate of -0.2598 for α_2^a given in equation (20), is -0.0725, not too far from the estimate for α_2 in equation (20) of -0.0630. Equation (21') implies an estimate for α_2 (=$-\alpha_3$) of -0.0318, not that different from the estimate in equation (21) of -.0434. Equation (21') also implies the following estimates for the remaining α_i (the estimates from equation (21) are reproduced in parentheses): α_0 = -0.0718 (-0.0174); α_4 = -0.6173 (-.7442) ; α_5 = -0.3385 (-0.6265).

The estimate of the semi-elasticity of long-run money demand with respect to the annual

rate of inflation ($\frac{1}{4}\frac{(\alpha_4+\alpha_5)}{\alpha_2}$) obtained from equation (21') is -7.5, very close to the estimate of -7.9 obtained from the quarterly data. The long-run seigniorage revenue maximizing annual rate of inflation derived from the annual estimates is 10.3 percent per annum, against the estimate of 9.7 percent per annum obtained from the quarterly data. The associated money base-GNP ratio is 3.4 percent of GNP, so long-run seigniorage cannot exceed 0.45 percent of GNP. If one were to misinterpret the α_i^q as α_1, the steady-state seigniorage revenue maximizing annual inflation rate, annual debt-GNP ratio and seigniorage-GNP ratio would be 8.9% p.a., 3.6% of GNP and 0.42% of GNP respectively. No harm would come from this error, because α_2 is very close to zero.

The matching of the quarterly and the annual estimates of course makes sense only if the disturbance terms in equations (23) and (25) have been treated properly in estimation and hypothesis testing.

These estimates of the long-run seigniorage Laffer curve, which are consistent with the view that the Fed has acted as if it wanted to maximize the steady-state share of seigniorage in GNP, should be taken with a pinch of salt.[22] It should also be noted that seigniorage is but one of the inflation tax instruments. The long-run seigniorage considered here can be interpreted as the steady state *anticipated* inflation tax. It is of course possible for a government operating in real time to use the anticipated but non-steady state inflation tax to obtain seigniorage revenues in excess of σ^m. In addition, it can use unanticipated inflation as a means of reducing the real value of its non-monetary but nominally denominated long-dated interest-bearing liabilities. It nevertheless seems unlikely that seigniorage revenue considerations play a major role in explaining the vagaries of the US government budget deficit.

This conclusion is reinforced by the realization that the consolidation of the accounts of the General government sector and the Fed does not imply that these agencies are also behaviorally integrated. The Fed is among the more independent central banks in the industrial world, as the avid courtship of Mr. Greenspan by the Clinton administration testifies. Unless the Fed is thought to be about to acquire serious short-run seigniorage objectives of its own (surely

an unlikely prospect), it is doubtful that the Congress or the Administration could bring enough pressure to bear on the Fed to induce it to seek inflation tax revenues significantly in excess of their current levels.

IV.3 Debt financing, intergenerational redistribution and financial crowding out.

When the government is solvent, the face value of the outstanding stock of debt of the consolidated general government and central bank is (less than or) equal to the present discounted value of the sum of future primary (non-interest) surpluses of the government and seigniorage. When we wish to evaluate the consequences of, say, an increase in the stock of public debt, we have to be clear about the alternative fiscal-financial-monetary scenarios we are comparing, that is, about the counterfactual to the original contingent sequences of revenues, expenditures and monetary financing. If in the alternative scenario the stock of debt in period t is higher by 1$ than in the baseline scenario, we know that the alternative scenario must in addition contain further counterpart differences from the baseline streams of future government revenues, non-interest outlays and/or seigniorage, that sum to 1$ in present discounted value. The answer clearly will be different if lower debt today in the baseline scenario is associated with lower future income taxes, higher future unemployment benefits, increased public sector spending on R&D or reductions in future seigniorage.

The simplest comparison is one between two paths of debt, taxes, public expenditure and seigniorage that differ only in the initial stocks of public debt and in the future paths of taxes and transfers. Exhaustive public expenditure programs are assumed identical along the two paths, both in magnitude and in composition and so are the paths of seigniorage. Only taxes and transfer payments differ between the two scenarios, and the comparison is further simplified by restricting taxes and transfers to be lump-sum[23].

Under these conditions, the low and high low initial debt paths will differ only to the extent that alternative debt and tax-transfer schemes redistribute resources between heterogeneous economic agents (Buiter [1991]). The key heterogeneity concerns the marginal propensities to spend out of current income, lifetime resources and financial wealth. Higher debt today implies (holding constant current and future exhaustive spending and seigniorage, and at given current and future interest rates and wage rates) a higher present discounted value of future taxes net of

transfers. If those who pay the future higher taxes or receive the future lower transfer payments are not the same as those who would have been taxed today (or who would have had their transfer payments reduced today) should the additional 1$ of debt not have been issued, redistribution takes place.

Financing through borrowing instead of through current taxation permits taxes to be postponed. Consider the simplest possible tax regime in which lump-sum taxes net of transfers are age-independent. The substitution of debt financing for current tax financing will unambiguously redistribute resources from the young to the old and from future generations yet to be born to those generations currently alive with whom they will overlap. The magnitude of the redistribution will be greater the longer the period for which taxes are postponed. This redistribution therefore goes from people with a high marginal saving rate to people with a low marginal saving rate.

At given relative prices, including intertemporal relative prices such as interest rates, this intergenerational redistribution raises aggregate private consumption demand. In a closed economy with full employment, this raises real rates of interest and "crowds out" or displaces interest-sensitive forms of expenditure such as private capital formation. In an open economy with international capital mobility, some or all of the increased private consumption demand may spill over into an increase in the current account deficit of the balance of payments. In an economy with Keynesian unemployment of productive resources, real economic activity may expand as productive slack is taken up. Any financial crowding out of private investment that occurs under conditions of Keynesian underemployment and excess capacity reflects a *policy choice*: with expansionary monetary policy the expansion of output could take place at a constant level of nominal and real interest rates.

While the actual US tax-transfer system is considerably more complicated than the age-independent scheme used in our example, it remains true that the substitution of borrowing for current tax financing, that is, the postponement of taxes, will redistribute from the young to the old and from future towards current generations.

In an influential paper, Robert Barro [1974], formalizing an argument made first by Ricardo, argued that the *prima facie* patently unrealistic picture of a government debt owner who is also the only person ever paying taxes to service that debt, may in fact be a reasonable first

approximation to reality. If there is intergenerational caring and if there is an initial equilibrium in which voluntary intergenerational transfers (bequests or child-to-parent gifts) occur among all successive generations, then government attempts to achieve *involuntary* intergenerational redistribution through the tax-transfer-public debt mechanism will be offset and neutralized by changes in private *voluntary* intergenerational transfers in the opposite direction.

Note that there always exists a scale of government intergenerational redistribution large enough to render the private sector incapable of neutralizing it. For instance, since negative bequests are ruled out, the government can always increase the scale of its redistribution from the old to the young to the point where the non-negativity constraint on bequests from the old to the young becomes binding, no matter what the initial (positive) magnitude of the bequests. The *debt-neutrality* or *Ricardian equivalence* proposition would then fail. How well the US economy is characterized by a gigantic intergenerational daisy chain is of course an empirical issue. Most recent surveys conclude that while debt-neutrality may be an interesting theoretical ideal-type, it is not an empirically valid proposition (see e.g. Bernheim [1987]). Financial crowding out remains a concern, especially in an economy with a saving rate as low as the USA.

A quite different proposition about the irrelevance of public debt and deficits has been advanced by Larry Kotlikoff (see e.g. Auerbach and Kotlikoff [1987], Kotlikoff [1989] and Auerbach, Gokhale and Kotlikoff [1991]). The overlapping generations (OLG) structure without operative intergenerational gift and bequest motives favored in these contributions, does have the implication that intergenerational redistribution achieved, for instance, through unbalanced government budgets, will affect aggregate consumption, as argued earlier. Kotlikoff argues, however, that the same redistribution can always be achieved in an (infinite) variety of ways, including scenarios without debt and deficits, that is, with permanently balanced government budgets. More generally it is without economic significance, whether a particular payment from (to) the government to (from) a household is labeled a payment of interest on an existing government (household) liability or a current transfer (tax) payment.

While there exist rarified economic models in which Kotlikoff's propositions are correct, for interesting classes of models it represents a misleading half-truth.

Certain special cases of Kotlikoff's argument are familiar. The issuing of debt serviced with taxes on the young will redistribute resources from the young to the old. Exactly the same

redistribution can be achieved with a balanced-budget, pay-as-you go or unfunded social security retirement scheme in which contributions by the working young are paid out as retirement benefits to the old. Kotlikoff generalizes this example in an attempt to show that there is no meaningful distinction between debt, taxes and transfers or between current transactions and capital or financing transactions. All that matters is the present discounted value of the current and future contingent net cash (strictly speaking net resource) flows between members of different generations and the government, summarized in the "generational accounts"[24]. Standard government debt is a claim to a sequence of future payments by the government. How is this different from the claim to future payments by the government encoded in current social security legislation? Likewise, anticipated future wage income taxes can be seen as a contingent claim on my future earnings owned by the government; this government asset can be set against its conventional liabilities. Why do we label some of these payments and receipts (taxes, transfers and interest) as "current" or "above the line" and others as "financing" or "capital" or "below the line"?

I accept the proposition that, with forward-looking private consumers, investors and entrepreneurs, anticipated future taxes, transfers payments, benefit entitlements and subsidies all may influence current consumption, labor supply, portfolio selection and capital formation. This is not the same, however, as accepting the proposition that giving me a government bond worth 1$ will affect my consumption behavior in the same way as would a matching increase in my anticipated future social security benefits, that is, a future stream of benefit increases with a present value of 1$, when discounted at the government's borrowing rate. This non-equivalence holds even if there is no aggregate risk and the government borrows at the riskless rate.

It is true that with completely unrestricted lump-sum taxes and transfers and in the presence of a complete set of contingent markets, public debt is redundant. Any intergenerational redistribution (and intergenerational insurance) that can be achieved with non-zero debt and unbalanced government budgets can also be achieved with zero debt and a permanently balanced government budget (see Wallace [1981], Chamley and Polemarchakis [1984], Sargent [1987] and Buiter and Kletzer [1992]). Without intra-generational heterogeneity and holding constant the government's exhaustive spending program, the intergenerational accounts, giving for each generation the present discounted value of current and future tax payments net of transfer

receipts, provide all the information needed to evaluate the impact of government fiscal-financial actions on private behavior. To state it like this is, of course, to underline the serious limitations of the debt-is-redundant proposition and the proposition that the generational accounts provided a sufficient statistic for the impact of fiscal policy on aggregate consumption demand. Buiter and Kletzer [1992] show, that if there are restrictions on the government's ability to use lump-sum taxes and transfer payments in a state-, time- and generation-contingent manner, then the ability to unbalance the budget allows the government to support equilibria that could not be supported with a permanently balanced budget: for better or worse, public debt matters. Note that in the model of Buiter and Kletzer, the generational accounts still are a sufficient statistic for the effects of fiscal-financial policy[25]; however, with unbalanced budgets the set of generational accounts that can be supported as equilibria will be richer.

The reason for the sufficiency of the generational accounts is that there are no distortionary taxes and that markets are complete [26]; specifically, there are no liquidity constraints or current-disposable-income constraints on private spending, and future labor income as well as transfers net of taxes provide perfect collateral for borrowing to finance current spending.

The simple key to understanding the role of public debt and deficits is to recognize that practically useful dynamic macromodels should have the following two properties: (1) the inherited stock of public debt constrains government behavior and (2) the ability to unbalance current and future budget deficits expands the government's choice set and permits, in principle, superior allocations to be supported [27].

Government and private sector decision making must be seen as sequential. Governments and households re-optimize (or re-satisfice) period- by- period. Plans, hopes, fears and expectations concerning the future are imperfect substitutes for binding forward contracts transacted once-and-for-all in the Grand Arrow-Debreu Market at the beginning of time. OLG models are helpful here, because, unlike representative agent models, they preclude the one-shot equilibrium interpretation and implementation of the Arrow-Debreu model[28]. Markets will have to re-open when new generations come on board. In addition, many contingent future actions of the government cannot be contracted for at all. Government liabilities are those future contingent government payments that the government has credibly committed itself to. Government debt is the subset of government liabilities that was acquired voluntarily by the owners of these liabilities

(it may but need not be marketable). Government transfer payments and subsidies are contingent future government payments that remain discretionary, that is, to which the government is not credibly committed. At time t, they remain subject to choice. With sequential decision making, the distinction between those actions that are constrained and those that remain discretionary matters. The entire literature on the time-inconsistency of optimal plans derives from this feature. In this view, at a point in time, the outstanding stock of debt, because it represents a credible commitment by the government to make certain (possibly contingent) future payments to the debt holders, constrains current and future taxes and transfer payments and exhaustive spending plans.

Credible commitment can either be achieved through a legal mechanism, such as the enforceability of certain government-private sector contracts in court, or through a political or reputational mechanism. While recognizing that credibility and commitment are continuous variables rather than zero-one dummies, it is a better first approximation to reality to use zero-one dummies than to treat all government (and private sector) future plans as fully credible. In other words, plans, anticipations, expectations, hopes and fears concerning future taxes and transfer payments are imperfect substitutes for a complete set of contingent forward contracts, credibly enforced, between the government and private agents. It therefore makes good sense, to a first approximation, to treat government debt as a binding obligation of the government that will be honored [29] , while taxes and transfer payments remain subject to discretion and become certain only when they are "in the bag". In addition, public debt is freely and voluntarily purchased or sold by the private owner of the debt, something that may of considerable interest as argued below. The irrelevance of the distinction between government debt, taxes and transfer payments breaks down completely when there are incomplete markets. For a number of legal and informational reasons, human capital, that is, future labor earnings, makes very bad collateral and so are future expected government transfer payments net of taxes. The abolition of slavery and indentured labor, and the inalienability (or at least severely restricted alienability) of labor income generally, account for the fact that financial claims and most physical, non-human assets are far superior to human capital as collateralizable stores of value. Private information and the associated problems of moral hazard and adverse selection provide an additional powerful reason for the non-existence of many contingent forward markets for labor services, taxes and transfer payments.

In Kotlikoff [1989], it is noted that the argument concerning the redundancy of the public debt and the sufficiency of the generational accounts breaks down when there are liquidity constraints on consumption spending. Just how fatal these key features of the real world are for the argument is not fully appreciated, however. With incomplete markets (specifically with liquidity constraints), it matters that private agents voluntarily choose their holdings of public debt while taxes constitute involuntary, non-discretionary payments by private agents. With asymmetric (private) information, government debt can act as a self-selection device for those who are not liquidity-constrained. The ability to issue public debt then enlarges the set of equilibria that can be supported.

Consider the following simple example. Because of the fact that future labor income cannot be attached, it cannot be used as collateral for private borrowing. Standard household preferences favor consumption smoothing over the life cycle. Households without non-human (liquid) wealth and with a rising age-earnings profile will therefore be constrained in their current spending by current disposable income. Their marginal propensities to consume out of small changes in current disposable income are unity. Households with positive non-human wealth and/or flat or declining age-earnings profiles are constrained in their spending by permanent income only. They will have marginal propensities to consume out of current disposable income that are less than unity. During recessions (periods of low aggregate output), current labor income is unusually low relative to future expected labor income. In addition non-human wealth may decline. During booms (periods of high aggregate output), the opposite conditions prevail. The force of the example is magnified if we assume that during a recession the fraction of households that are current-disposable-income-constrained is higher than during a boom, but its qualitative features do not depend on this. The business cycle could be entirely "real", driven by exogenous shocks to average and marginal labor productivity, or it could be Keynesian.

The government taxes current labor income of all households at the same rate. The reason could be that it cannot distinguish between households that are current-disposable-income-constrained and those that are only permanent-income-constrained. Labor is supplied inelastically. Taxes (which can be negative) are therefore lump-sum but restricted. Government exhaustive spending is constant and so is the interest rate on the public debt (say because we are dealing with a small financially open economy and there is no government default risk).

In scenario 1 the government has a balanced budget at each instant. This means high tax rates in a slump and low tax rates during a boom. In scenario 2 the government keeps tax rates constant over the cycle, at the level required to keep the public debt constant (possibly at zero) over an entire cycle rather than period-by-period as in scenario 1. Relative to scenario 1, tax rates are therefore lower in scenario 2 during a slump and higher during a boom.

The higher (relative to scenario 1) boom-time tax rates in scenario 2 do not cancel out the positive effect on aggregate consumption during the slump of lower slump-time tax rates. The public debt issued to finance the scenario 2 government deficit during a slump, will be bought exclusively by households that are only permanent-income-constrained. Consumption during a slump by current-disposable-income-constrained households in scenario 2 exceeds that in scenario 1 by the full amount by which their taxes are lower during a slump in scenario 2 than in scenario 1. The fact that they will pay higher taxes during the boom does not affect their consumption decision during the slump, since they are current-disposable-income constrained. If they are still current-disposable-income-constrained when the boom comes, their consumption in scenario 2 will be lower than their consumption in scenario 1 by the full amount of the excess of boom-time taxes under scenario 2 over boom-time taxes under scenario 1[30].

The government's borrowing and lending permit more consumption smoothing over the business cycle than would be feasible with a continuously balanced budget. The consumption of permanent-income-constrained households during the slump is the same in the two scenarios, as the present discounted value of the taxes they pay over an entire cycle is the same. Note that government borrowing during a slump permits it to extract additional resources from the permanent-income-constrained households, even though it cannot differentiate between them and the current-disposable-income constrained households. Taxes, the involuntary resource transfer mechanism, cannot be used to differentiate between the two types of households. Sales or purchases of public debt, the voluntary resource transfer mechanism, cause the permanent-income-constrained households to differentiate themselves from the current-disposable-income-constrained households.

The superior consumption smoothing permitted through the financial intermediation of the government is desirable from an intertemporal allocation and welfare point of view even if there are no Keynesian aggregate demand failures. The welfare costs of binding liquidity or current-

disposable-income constraints would be more severe if a reduction in consumption demand during a slump were to have Keynesian multiplier effects.

Note that in the example it is not just the present discounted value of the net cash (or resource) flows between a liquidity-constrained private agent and the government (that is, the household's generational account) which matters for the private agent's behavior. The actual time pattern of the net cash flows matters for the liquidity-constrained household. While there may exist a set of "shadow discount rates" (different from the interest rate on the public debt) that reduce the sequence of cash flows of the liquidity-constrained household to a "shadow present value", this does not add anything to the analysis.

The example just given goes to the heart of the Keynesian argument for countercyclical government deficits. The neoclassical argument for countercyclical budgets is based on the desirability of smoothing distortionary tax and transfer rates over time. Even if there is "first-order" debt neutrality or Ricardian equivalence (as in the intergenerational daisy-chain economy), the option of departing from a balanced budget may be valuable if there are no lump-sum, non-distortionary tax-transfer schemes available. Borrowing, that is, the voluntary acquisition by the private sector of a credible claim on the government for a future stream of payments, is a non-distortionary means of financing current outlays. Deficits and surpluses therefore permit changes in the time-profile of the excess burden associated with non-lump-sum taxes and transfers. Tax administration and collection costs that are increasing and strictly convex in the marginal tax rate will provide a similar efficiency motive for departures of current outlays from current revenues. Under rather restrictive separability and homogeneity assumptions, a strict tax rate smoothing prescription emerges (see e.g. Barro [1979]). The proposition that, from a neoclassical public finance point of view, balanced budgets are suboptimal is, however, more robust than the tax-smoothing result.

V. Public sector investment.

An interesting indicator of the historical lack of importance attached to public sector capital formation is the absence of systematic and readily available official statistics on the subject. One looks in vain for data on Federal and State and Local investment in the Statistical Tables attached to the Economic Report of the President. The Historical Tables published by the

Office of Management and Budget [1992], contain annual series on "Federal Government Outlays for Major Physical Capital Investment" from 1940 to 1991. Some of these are reproduced in Table 10 below. There is no government publication providing regular and comprehensive statistics on state and local capital formation. Together these two no doubt account for more infrastructure investment than the Federal government.

Based on Office of Management and Budget [1993], Table C1, reproduced below as Table 11, the Major Federal capital outlays reported in Table 10, represent the overwhelming majority of Total Federal capital formation today.

The capital formation figures in Tables 10 and 11 refer to gross investment. In Office of Management and Budget [1993], Table E1, we are given figures on the stocks of physical reproducible assets and inventories of the Federal government. These are given in Table 12. The problems of valuing the stock of defense capital are daunting. What is an ICBM worth after the collapse of the Soviet Union?

The real value of the reproducible Federal capital stock only increased by 22 billion 1992 dollars from 1991 to 1992. Out of $236 billion gross investment by the Federal government in 1992 (Table 11), about 70 percent (see Table 10) or $ 165 billion was spent by the Federal government directly rather than in the form of grants (mainly to state and local government). This $165 billion gross investment must have been largely offset by $143 billion depreciation.

The view that net Federal government capital formation is currently close to zero is also expressed in the 1993 Annual Report of the Council of Economic Advisers. The single paragraph of the Report devoted to government investment (another indicator of the importance attached to the issue in official circles until recently) also contains a non-sequitur and a potentially misleading conclusion.

The non-sequitur relates to the Report's brief discussion of the failure of the government budget to distinguish systematically between investment and consumption expenditures. It is a familiar one. The Report notes, correctly, that it is not always easy to distinguish between capital and current expenses. This is true, and it applies to private sector expenditures of time and money on education, training, health, research and development and household production etc., as much as to public sector expenditures.[31] The Report goes on to say, again quite uncontroversially, that the distinction between capital and current expenses can be subject to

political controversy since special interests may have a stake in whether expenditures are labeled as consumption or investment. It concludes that the current cash flow accounts "require less in the way of arguable judgements" (p. 251 § 5). By requiring no judgement at all, the current cash flow accounts treats capital and current spending as equivalent, which makes the accounts at best uninformative and at worst misleading. The Report effectively argues that, if it is hard to get something absolutely right, the proper response is to do something that is absolutely wrong!

The potentially misleading statement in the concluding sentence of the paragraph is the following: "Several studies show that correcting recent deficits for government investments would have resulted in relatively small changes because of offsetting adjustments for the depreciation of the government's capital assets" (p. 251).

Let us accept the proposition that net (Federal) investment has indeed been close to zero in recent years. What matters for the government's properly corrected deficit, whether we are interested in the evolution of the debt-GDP ratio or of the net debt-GDP ratio, in the eventual monetization of deficits or in solvency, is not, however, the magnitude of the government's net investment flow. What matters are (1) the relationship between the government's marginal cost of funds and the net cash rate of return it appropriates, directly or indirectly, on its new capital assets *should they remain in the public sector*, $r - (\rho-\delta)$, in the notation of Section III, and (2) the value the new public sector capital could realize through sale outside the public sector (through privatization), p^k in terms of the notation of Section III.

By subtracting net investment from the conventionally measured government deficit, one assumes implicitly that, whatever the real cash rate of return earned by an increment to the public sector capital stock while it remains in the public sector, it is always possible to realize through sale of the asset, the real historic cost of the investment (net of depreciation), that is, one assumes that $p^k = p$. It wouls seem to be extremely unlikely that this condition is satisfied for some of the highly specialized public sector capital (let alone for the white elephants). The extent to which investment is irreversible and investment costs are sunk is underestimated by these " net investment corrections". For instance, if a piece of infrastructure capital yields no direct or indirect cash returns to the government and if it has no privatization value, then, for government budgeting purposes, the investment in that piece of infrastructure is equivalent to consumption. No corrections to the conventional deficit are required.

VI. Conclusion and further food for thought.

How serious is the American government's budgetary problem? A minimalist view of the US budgetary problem would lead one to focus on the achievement of a *sustainable* deficit. Table (8a,b) and (9) summarize the relevant information. Extrapolating the 1992 cyclically corrected deficit, the General government permanent primary gap is between 0.35% and 1.65% of GDP. Taking the Clinton February 1993 proposals for the period 1993-98 as our benchmark, the General government permanent primary gap is between 0.12% to 1.02% of GDP.

Despite the recent history of fiscal stalemate in Washington DC, a resolution of this issue, that is, a credible way to fill these permanent primary gaps, should be in the feasible set. This is the good news.

The bad news is that the currently visible deficit problem is but the tip of the iceberg. Lurking under the water are, first, the spending trends already contained in the laws, programs and regulations inherited by the Clinton administration. Prominent among these are planned increases in Federal contributions to medicare and medicaid from $188.5 billion in the 1992 budget to $348.4 billion dollars in 1997 (under the ancien regime).

A continuation of the current levels of nominal and real interest rates, which now are low throughout the maturity structure, both by recent historical and by international standards, is by no means certain even in the short run and becomes quite unlikely when one looks a year or more ahead. With a 50% debt-GDP ratio, every one percentage point increase in the level of interest rates now adds 0.5% of GDP to the spending totals.

As longer-term problems loom the eventual disappearance of the Social Security current surplus (the sum of the operating and interest surpluses). In the 1992 Federal Budget the Social Security surplus was still predicted to increase from $50.2 billion in 1992 to $115.0 billion in 1997. The temptation to treat these surpluses as permanent current revenues will be hard to resist.

Also lurking under the water, but becoming gradually more visible, are the problems of financing the kind of Federal, State and Local government programs that the new administration has identified as necessary to meet America's needs in the fields of health care, education and training, research and development, revitalization of the inner cities, deferred maintenance of existing infrastructure and new infrastructure projects in the fields of public transport and telecommunications.

The revealed unwillingness of the American tax payer to shoulder a high and increasing overall tax burden is reflected in Table 13, which shows General government current receipts as a percentage of GDP for ten industrial countries. The US figure for 1989 is, at 31.8%, the lowest of the ten. Only by Switzerland (34.1%) and Japan (33.4%) come close. For the whole of the OECD except the USA, the figure is 40.3%. Table 14 shows how General government exhaustive spending (purchases of final goods and services) has been essentially constant as a share of GDP since 1960. The declining share of the Federal government has been offset by growth of the State and Local sectors. The growth in the share of total public spending in GDP has been entirely due to net interest and especially to social security and Medicare outlays.

This secular decline in the GDP share of Central government exhaustive spending is unique to the US, among all the industrial countries. It is a reflection of the relative and absolute weakness of the central government in this country and is reflected in the decrepit state of much of the stock of social overhead capital. I anticipate that during the coming decade we will see another form of "convergence" among the industrial countries. While many of the West-European industrial countries will continue with attempts to reduce the size and scope of their oversized public sectors, the US will see a movement in the opposite direction, to increase the size and scope of its undersized public sector, especially at the Federal level.

Either the Clinton administration will have to shelve its programs and abandon its longer-term agenda in the areas mentioned earlier, or it will have to shift the political equilibrium in the direction of a greater tolerance for higher taxes, perhaps at the level of Canada or Germany. The resolution of this political economy problem will be much more difficult, and more important, than coping with the deficits associated with the spending programs of the past 12 years. If the Clinton economic and social agenda is to be realized,. the modest budgetary measures envisaged in the February 1993 budget proposals are to be viewed as a first step in a more ambitious program of tax increases, selective spending cuts and overall spending increases.

The recently proposed budgetary measures should have a favorable impact on the second major macroeconomic problem faced by the American economy, that of the disappearing American savings rate staring at us from Table 15. Both by historical and by international standards, the 1990 gross national saving rate of 14.4% of GDP is extremely low. Even if a lower national saving rate does not imply *pari passu* a lower rate of domestic investment (because

would-be investors can borrow abroad to finance domestic capital formation), gross national product will be lower than it would have been with a higher saving rate, and so will the future living standards of US residents. In addition there is evidence to support the view that a reduction in the national saving rate does reduce domestic capital formation, even if not one-for-one (see e.g. Feldstein and Horioka [1980] and J.A. Frankel, M. Dooley and D. Mathieson [1987]).

Measures to reduce the government deficit should increase the full employment national saving rate, but less than dollar-for-dollar. The reduction in the deficit currently planned by the Clinton administration only amounts to 2.3% of GDP (from 5.4% of GDP in 1993 to 3.1% of GDP in 1998). Additional measures will therefore be required if the objective is to bring the US saving rate back up to the 20% achieved in the early 70's, let alone up to a level consistent with a comfortable retirement for the currently active generations and an adequate stock of capital (physical and human) for future generations.

A start could be made with implementing proposals to fund social security retirement plans, with individual accounts, at least for new entrants to the labor force. While this is a form of "forced saving", a touch of benevolent paternalism might not be misplaced in the domain of intertemporal choice[32]. Finally, a consumption tax could be substituted for the Federal income tax. Whether these three measures will suffice to push the American gross national saving rate into the low twenties remains to be seen, but without them a continuation of the present abysmal performance is all we can look forward to.

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Notes

1.For ease of exposition I use percentages, that is ratios*100 rather than ratios.

2.It includes sponsored credit agencies and the Federal Reserve System. Some tangible wealth is included for these agencies. Source: Economic Report of the President [1993], Table B-110.

3.The General government is the Federal government (including Social Security and Off-budget funds), plus State and Local government

4.The Maastricht Treaty of December 1991 specified one of the fiscal convergency criteria for membership in EMU in terms of the Gross General government debt-GDP ratio. See Buiter, Corsetti and Roubini [1992].

5.The OECD [1992] puts the change in the cyclically-adjusted general government financial deficit during 1991 and 1992 at 1.5% of GDP less than the change in the uncorrected financial deficit. The change in the cyclically-adjusted *primary* balance during these same two years is put at 1.6% of GDP less than the uncorrected financial deficit.

6.The NBER business cycle dating committee defines a recession as two or more successive quarters of negative GDP growth. While everyone is entitled to their definition, I use the term "recession" in a manner closer to common usage, to characterize a situation in which the growth rate of actual output is below that of potential output. Potential output or productive capacity will tend to grow more smoothly than actual output, because of labor force growth, capital accumulation and technical progress.

7.The OECD [1992] figure of a General government primary deficit equal to 2.5% of GDP in 1992 is higher than the figure I obtain from US sources. The Office of Management and the Budget [1993, Tables 15.5 and 15.6] gives a General government deficit of 4.7% of GDP in 1992 and net interest for that year equal to 2.6% of GDP, yielding a primary deficit (shown in Table 4) of 2.1% of GDP. For 1991 the OECD [1992] figure is a 1.1% of GDP deficit, while OMB [1993] comes up with a 1.9% of GDP deficit. The OECD figure, which is on a NIPA basis, excludes deposit insurance outlays. This does not, however, account for all of the difference.

8.$55.8 billion or less than 1% of GDP at the end of 1991 if gold is valued at SDR 35 per ounce and $ 160 billion (or 2.8% of GDP) if gold is valued at its market price.

9.This is different from the data reported in the previous section, which refer to the general government only. When general government and central bank are consolidated, the interest-bearing liabilities of the consolidated unit ("the government") are the interest-bearing liabilities of the general government net of the interest-bearing general government debt held by the central bank (central bank credit to the general government) and minus foreign exchange reserves. The monetary, non-interest bearing liabilities of the central bank become "government" monetary liabilites.

10.Base money or high-powered money is a liability of the central bank. It is the sum of currency held by the public and commercial bank reserves held with the central bank.

11. For simplicity the current reproduction cost of government capital is assumed to be given by the GDP deflator. Internal adjustment and installation costs are also ignored.

12.ρ need not be the same as the real social rate of return on the public sector capital stock. Even where this social rate of return is very high, the government may not be willing or able to appropriate (capture) as cash income, directly (through charges or user fees) or indirectly (through increases in the tax base brought about by the private productivity-enhancing effect of the public sector capital stock) all or any of these social returns. Conversely the government could invest in forms of capital that do not have any social returns, but whose only function is to facilitate capturing revenue for the government. Examples are the construction of toll booths on freeways and bridges.

13.What matters for the validity of the government solvency constraint that follows, is that successive government administrations honor the debt they inherit.

14.Note that the primary surplus concept changes depending on the stock variable (debt or net liabilities are the two alternatives considered here) that one assumes to constrain government behavior.

15.The average length of maturity of interest-bearing public debt securities held by private investors in November 1992 was 5 years and 11 months (Economic Report of the President [1993], Table B-83). The average length has increased steadily from the mid-seventies until 1989 and has remained practically constant since then.

16.If the reduction in the gap is due to a reduction in the nominal rate of interest, the demand for money is likely to increase, and so may seigniorage. If the reduction in the gap is due to higher inflation, the demand for money is likely to fall, and with it seigniorage. If it is due to an increase in the growth rate of real GDP, the implications for real money demand and seigniorage are ambiguous. For simplicity, the assumed share of seigniorage in GDP is held constant at 0.25% of GDP in these illustrative calculations.

17. In 1992 the sum of the payments to the public made by the Federal employees retirement funds and the Military retirement fund was $57.5 billion or 0.97% of GDP (Office of Management and Budget [1993], Table 4.3 or 3.2.).

18.OECD Economic Outlook, 52, December 1992, Table 46, p. 146.

19.In both cases the cyclical corrections of the OECD[1992] are used.

20.Bohm [1992] estimates unfunded Federal Pension liabilities to be 19% of GDP in 1989.

21. GNP data are quarterly figures expressed at quarterly rates. The interest rates and the rate of inflation are also expressed at quarterly rates. The money stock is the end-of quarter monetary base.

22. Note that the Fed uses its profits to pay a six percent rate of return to its shareholders and to defray its costs, but that the Treasury is the residual claimant on the profits of the Fed. Assuming that there are reasonably tight limits on the ability of the Fed to turn profits into expenses, an independent Fed would not be very likely to be motivated by seigniorage considerations.

23.Taxes and transfer payments are lump-sum when individual economic agents cannot influence their incidence by changing their behavior. Such taxes and transfer payments are therefore non-distortionary (and also incapable of correcting any pre-existing distortions). Lump-sum taxes and transfers can, however, influence individual behavior, but only through income effects.

24. Heterogeneity within generations can be added without changing the conclusions, as long as there are unrestricted lump-sum taxes and transfers.

25.Here and in what follows, the magnitude and composition of the govenment's exhaustive spending program is held constant across all alternative scenarios.

26.Because of the OLG structure there is incomplete market participation.

27.The argument that follows owes much to Henning Bohn's imposing paper on budget deficits and government accounting (Bohn [1992]).

28.The same equilibrium supported by a complete set of contingent spot and forward markets can also be supported by (1) a complete set of contingent forward market for the numeraire and (2) a sequence of complete spot markets for all other goods. This won't help, because neither (1) nor (2) applies in a world with interesting asymmetric information.

29.Except possibly under certain extreme circumstances when honoring these commitments would either be infeasible or prohibitively costly. Force majeure is a well-recognized legal principle.

30.If they are no longer current-disposable-income-constrained when the boom comes, their boom-time consumption need not be lower in scenario 2 by the full amount of the difference in boom-time taxes between the two scenarios.

31.Even if the capital vs. current issue is settled, there exist equally severe problems with the proper economic classification of much of the spending correctly identified as non-capital. Government current spending on "regrettable necessities" such as defense, law and order and most public administration is not consumption spending al all (who enjoys the sight of civil servants at work?), but spending on ***intermediate public goods and services*** (often non-rival up to some level of private activity, but congestible beyond that point). However valuable or even essential for the production of true final goods and services, such expenditures are not themselves final expenditures. They therefore should not be counted in GDP or value added at all. Again,

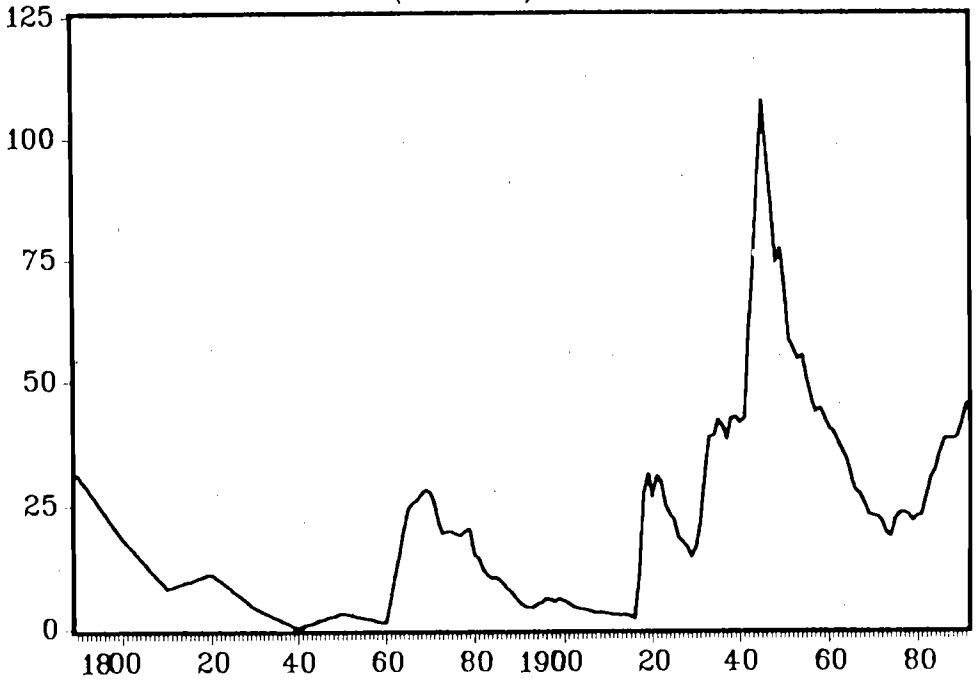
similar problems arise in the private sector. Current private expenditures on health and private security services also are intermediate in nature and should not be counted as consumption or investment. The same holds for many goods and services (grass seeds, pool cleaning) that are intermediate inputs in household economic activity.

32.A key empirical issue is the magnitude of the reduction in discretionary private saving when a forced saving scheme like funded social security retirement saving is introduced.

Figure 1

Federal Debt 1790–1991

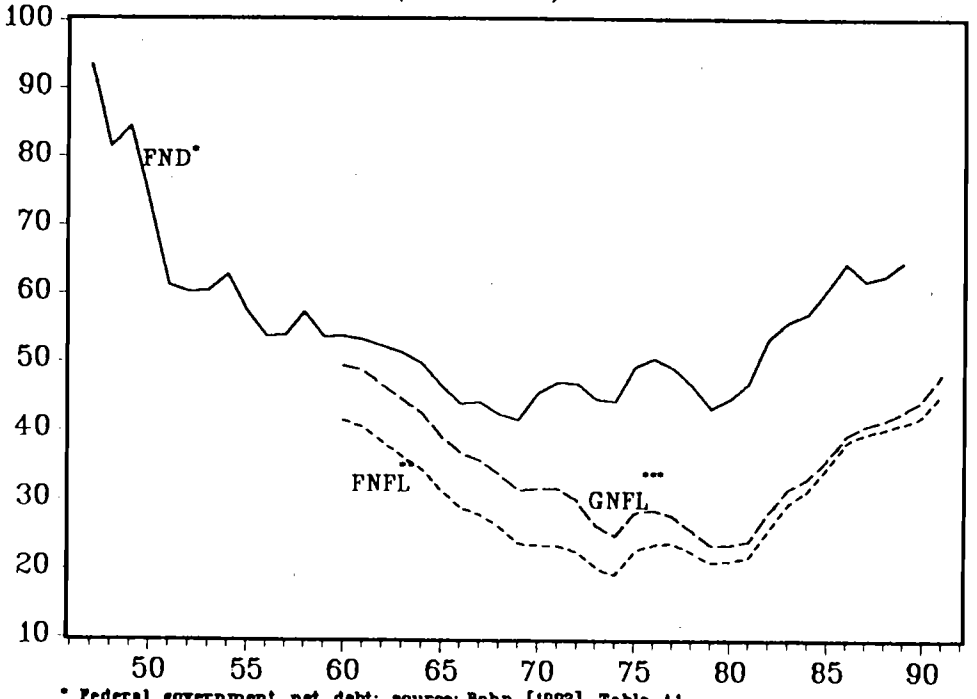
(% of GDP)



*Gross federal debt held by the public.
Source: series made available by Robert J. Barro

Figure 2

Government net financial liabilities
(% of GDP)



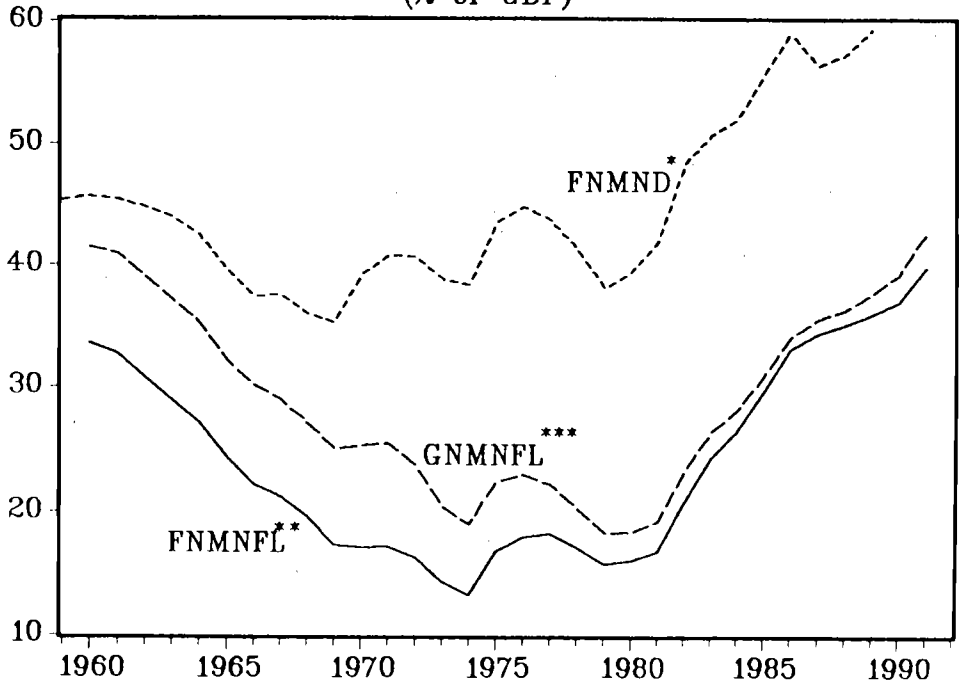
* Federal government net debt; source: Bohn [1992], Table A1

** Federal government net financial liabilities; source: Economic Report of the President [1993], Table B-110.

*** General government net financial liabilities; source: Economic Report of the President [1993], Table B-110.

Figure 3

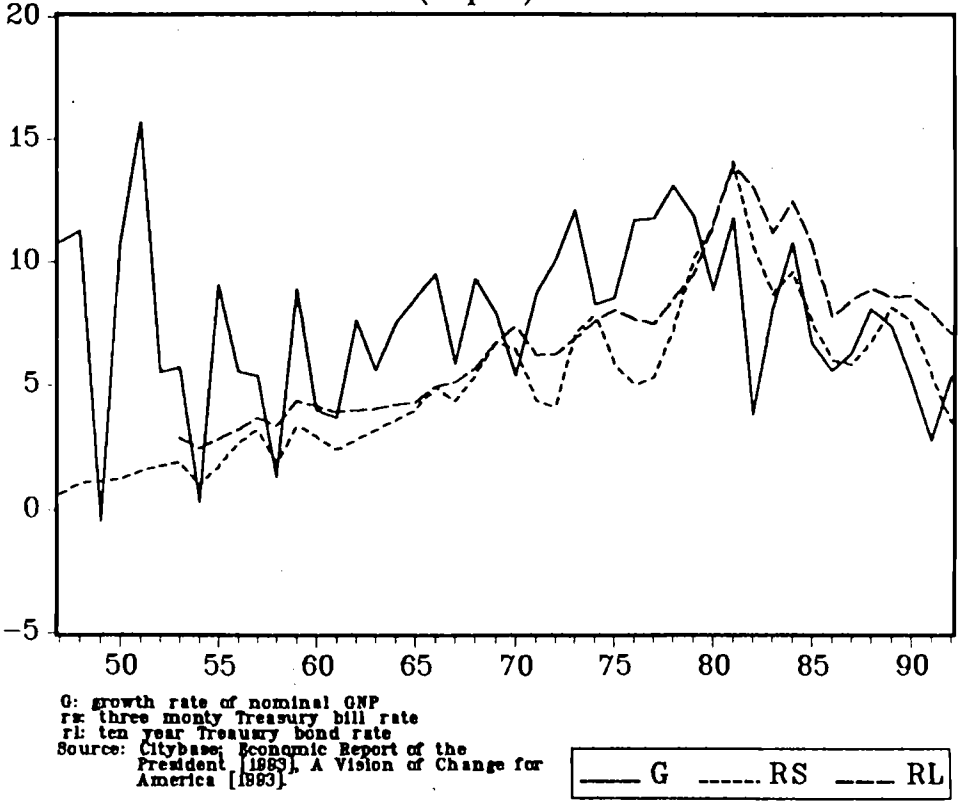
Government non-monetary net financial liabilities
(% of GDP)



* Federal government non-monetary net debt.
** Federal government non-monetary net financial liabilities.
*** General government non-monetry net financial liabilities.
Sources: see Figure 2.

Figure 4

US interest rates and GNP growth rates
(% p.a.)

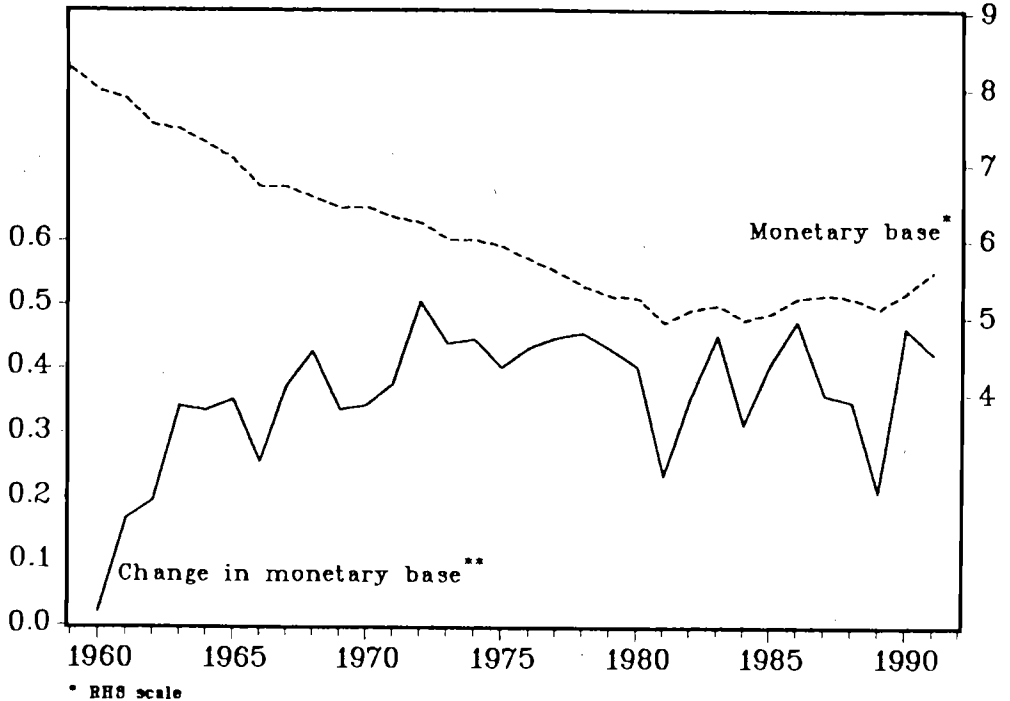


G: growth rate of nominal GNP
rs: three monty Treasury bill rate
rl: ten year Treasury bond rate
Source: Citybase; Economic Report of the President [1993], A Vision of Change for America [1993].

Figure 5

Monetary base and change in monetary base

(% of GDP)



* RHS scale

** LHS scale

Source: Economic Report of the President [1983]

Table 1

General government net debt
selected OECD Countries% of GDP

Liabilities (+) or assets (-)

	1974	1979	1989	1992
High-debt countries				
Belgium	47.2	62.0	120.3	124.3
Italy	44.6	55.6	96.1	106.7
Ireland	57.6	73.4	107.3	97.4
Greece	20.3	27.6	73.5	81.7
Medium-debt countries				
Netherlands	19.0	21.8	57.2	59.7
Canada	4.9	12.1	40.3	53.7
Austria	17.6	36.0	56.9	52.1
USA	21.7	19.1	30.4	37.9
Spain	..	5.8	30.4	35.8
UK	59.9	47.8	30.4	35.6
Low-debt countries				
Denmark	-13.6	1.8	26.0	29.1
France	8.1	13.8	24.8	28.8
Germany	-4.7	11.5	22.5	22.7
Australia	..	..	12.2	15.8
Finland	-10.6	-6.8	-1.6	11.0
Japan	-5.3	14.9	14.7	6.1
Sweden	-30.1	-19.8	-5.4	3.4
Norway	-9.2	9.8	-20.2	-16.6
Average[a]	14.2	22.7	39.8	43.6

Note: The data for Austria, Greece and Ireland refer to gross financial liabilities.
The debt data for Australia refer to fiscal years.

a) Unweighted average.

Source: *OECD Economic Outlook*, 52, December 1992.

Table 2

General government gross public debt

seven largest OECD countries
(% of GDP)

	1984	1988	1992[a]
USA	45.2	53.2	63.0
Japan	67.9	72.8	64.9
Germany	42.0	44.8	44.0
France[b]	43.8	46.8	50.1
Italy	77.4	94.8	108.4
UK	54.6	42.5	41.9
Canada	59.1	69.3	82.3
Average[c]	53.2	59.1	63.0

a) OECD estimates.
b) Does not exclude public sector mutual indebtedness.
c) 1987 GDP weights and exchange rates.
Source: *OECD Economic Outlook*, 52, December 1992.

Table 3

General Government financial surpluses,

selected OECD Countries.
(% of GDP)

	1972	1980	1990
USA	0.5	-1.0	-3.4
Japan	0.5	-3.8	2.4
Germany	1.2	-3.7	-3.2
France	0.6	-1.9	-2.2
Italy	-7.9	-11.6	-10.2
UK	-2.7	-2.6	-2.8
Canada	0.9	-1.5	-6.1
Netherlands	0.9	-5.5	-2.6
Sweden	4.1	-5.3	-1.5

Source, *OECD Economic Outlook, 52,* December 1992

Table 4

Primary balances for the Federal and State and Local governments in the USA.

	General			Federal			State and Local		
	Financial surplus	Net interest paid	Primary surplus	Financial surplus	Net interest paid	Primary surplus	Financial surplus	Net interest paid	Primary surplus
1947	2.5	1.9	4.4	1.8	1.9	3.7	0.7	0.0	0.7
1960	0.1	1.4	1.5	0.1	1.4	1.5	0.1	0.0	0.1
1970	0.1	1.3	1.4	-0.3	1.5	1.2	0.4	-0.2	0.2
1980	-1.9	1.3	-0.6	-2.8	2.0	-0.8	0.9	-0.7	0.2
1985	-4.0	2.3	-1.7	-5.3	3.3	-2.0	1.4	-1.0	0.4
1990	-3.5	2.4	-1.1	-4.0	3.4	-0.6	0.6	-1.0	-0.4
1991	-4.5	2.6	-1.9	-4.8	3.5	-1.3	0.3	-0.9	-0.6
1992	-4.7	2.6	-2.1	-4.9	3.4	-1.5	0.3	-0.8	-0.5

Source: Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future*, January 1993.

Table 5

General government primary balances[a]

seven largest OECD countries
(Surplus (+) or deficit (-) as a percentage of GDP)

	1984	1988	1989	1990	1991	1992
USA[b]	-0.9	-0.1	0.5	-0.4	-1.1	-2.5
Japan[c,d]	-0.3	2.5	3.4	3.6	2.8	1.7
Germany[e]	0.4	0.2	2.4	0.1	-1.0	-0.6
France	-0.9	0.5	1.1	1.0	0.3	-0.2
Italy	-4.1	-3.1	-1.4	-1.8	-0.5	-0.2
UK	-0.6	3.7	3.3	1.0	-0.9	-4.5
Canada	-2.9	1.9	1.8	1.3	-0.5	-0.3
Average[d]	-0.9	0.7	1.5	0.7	0.0	-1.1

a) Overall balance less net interest payments on public debt. Figures are on a SNA basis except for the USA and the UK where the data are based on national methods.
b) Excludes deposit insurance outlays.
c) OECD estimates and projections.
d) Net property income paid rather than net interest payments is used as the latter is not available.
e) 1987 GDP weights and exchange rates.
Source: *OECD Economic Outlook*, 52, December 1992.

Table 6

Interest rates and GNP growth rates in the USA

(% p.a.)

	Average growth rate of nominal GNP	Average short rate*	Average long rate
1953-92	7.39	5.57	6.84
1953-59	5.11	2.22	3.22
1960-69	6.88	3.98	4.67
1970-79	10.09	6.29	7.49
1980-89	7.67	8.82	10.59
1980-92	6.92	8.04	9.95

* Three month Treasury Bill rate.

** Yield on ten year Treasury securities.

Source: see Figure 4.

Table 7
Interest rates and nominal GDP growth rates,
Clinton budget economic assumptions.

	1992	1993	1994	1995	1996	1997	1998
Nominal GDP growth (% *)	5.3	5.9	6.2	5.7	5.5	5.5	5.5
91-Day Treasury Bill Rate (%**)	3.5	3.7	4.3	4.7	4.8	4.9	5.0
10-Year Treasury Note Rate (%**)	7.0	6.7	6.6	6.5	6.5	6.4	6.4

* Percent change, fourth quarter over fourth quarter.
** Annual average.
Source: A Vision of Change for America [1993].

	Table 8a Federal government Minimal Required Permanent Primary Surplus & Seigniorage (% of GDP)			
(1)	Interest rate minus growth rate (% p.a.)	0.00	1.00	2.00
(2)	Debt-GDP ratio (annual, %)	65.00	65.00	65.00
(3)	Required permanent primary surplus plus seigniorage (% GDP)	0.00	0.65	1.30
(4)	Assumed permanent seigniorage (% GDP)	0.25	0.25	0.25
(5)	Required permanent primary surplus (% GDP)	-0.25	0.40	1.05
(6)	1992 Actual primary surplus (%GDP)	-1.5	-1.5	-1.5
(7)	1992 Cyclically corrected primary surplus (% GDP)*	0.01	0.01	0.01
(8)	Federal retirement and disability benefit payments correction (% GDP)	0.60	0.60	0.60
(9)*	Permanent primary gap (% GDP)	-0.86	-0.21	0.44

* (9) = (5) - (7) - (8).

	Table 8b General government Minimal Required Permanent Primary Surplus & Seigniorage (% of GDP)			
(1)	Interest rate minus growth rate (% p.a.)	0.00	1.00	2.00
(2)	Debt-GDP ratio (annual, %)	45.0	45.0	45.0
(3)	Required permanent primary surplus & seigniorage (% GDP)	0.00	0.45	0.90
(4)	Assumed permanent seigniorage (% GDP)	0.25	0.25	0.25
(5)	Required permanent primary surplus (% GDP)	-0.25	0.20	0.65
(6)	1992 Actual primary surplus (%GDP) (OECD[1992])	-2.5	-2.5	-2.5
(7)	1992 Actual primary surplus (%GDP) (OMB[1993])	-2.1	-2.1	-2.1
(8)	1992 Cyclically corrected primary surplus (% GDP) "(OECD[1992])"	-1.0	-1.0	-1.0
(9)	1992 Cyclically corrected primary surplus (% GDP) "(OMB[1993])"[ab]	-0.6	-0.6	-0.6
(10)*	Permanent primary gap (% GDP) (OECD[1992])	0.75	1.20	1.65
(11)*	Permanent primary gap (% GDP) (OMB[1993])	0.35	0.80	1.25

[a] Assuming a zero cyclical correction is applied in 1990.
[b] The OECD[1992] cyclical correction is applied.
*(10) = (5) - (8)
**(11) = (5) - (9)

Table 9
PRESIDENT CLINTON'S PROPOSED STRUCTURAL DEFICITS
(Fiscal years, in billions of dollars)

	1993	1994	1995	1996	1997	1998
Baseline deficit	319.2	301.3	295.9	297.0	346.3	389.7
Cyclical component	66.8	51.6	36.3	24.0	16.8	16.1
Deposit insurance	6.9	7.9	-4.0	-12.5	-11.3	-7.3
Baseline structural deficit	245.5	241.8	263.6	285.5	340.8	380.9
Effect of policy proposals	12.7	-38.9	-54.2	-91.7	-139.8	-148.3
Proposed deficit*	332 (5.4)	262 (4.0)	242 (3.5)	205 (2.9)	206 (2.7)	241 (3.1)
Proposed structural deficit*	258.2 (4.2)	202.9 (3.1)	209.4 (3.0)	193.8 (2.7)	201.0 (2.6)	232.6 (3.0)
Net interest*	202.1 (3.2)	212.0 (3.2)	227.2 (3.2)	243.3 (3.2)	257.4 (3.3)	272.7 (3.3)
Proposed structural primary deficit*	56.1 (1.0)	-9.1 (-0.1)	-17.8 (-0.2)	-49.5 (-0.5)	-56.4 (-0.7)	-40.1 (-0.3)

* As a percentage of GDP given in parentheses below $ amount.
Source: *A vision of change for America*, Tables 3-1 and 3-2 and Appendix Tables 7 and 12, U.S. Government Printing Office, Washington D.C. February 1993. GDP estimate for 1991 from Economic Report of the President [1993].

Table 10					
Federal outlays for major public physical capital investment (% of GDP)					
	Total	Direct Federal			Grants
		Total	Defense	Non-defense	
1940	3.5	3.0	0.9	2.1	0.5
1944	29.7	29.7	29.5	0.1	0.1
1960	4.4	3.8	3.4	0.4	0.7
1970	3.4	2.7	2.4	0.3	0.7
1980	2.4	1.5	1.2	0.3	0.9
1985	2.9	2.3	2.0	0.3	0.6
1990	2.4	1.9	1.6	0.3	0.5
1991	2.3	1.8	1.5	0.3	0.5
1992	2.3	1.8	1.4	0.4	0.5

Source:Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future*, January 1993.

Table 11

Composition of Federal Capital Outlays
(billions of dollars)

	1992 actual	1993 estimate
Major Federal capital outlays	232.8	244.1
Defense	119.7	117.5
Non-defense	113.1	126.7
Miscellaneous physical capital	3.3	4.7
Commodity inventories	-0.9	-0.3
Other (non-defense, direct)	4.2	4.9
TOTAL	236.1	248.8

Source: Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future*, January 1993, Table C-1, p. 506.

Table 12

Federal government reproducible capital stock.
(end of fiscal year; billions of 1992 dollars)

	1960	1970	1980	1985	1990	1991	1992
Fixed reproducible capital	973	1014	816	885	960	965	985
Defense	827	828	574	652	721	730	741
Non-defense	146	186	243	233	238	235	244
Inventories	252	200	216	237	206	185	187
Total reproducible capital	1225	1214	1032	1122	1166	1150	1172

Source: Office of Management and Budget [1993], *Budget Baselines, Historical Data, and Alternatives for the Future*, January, Table E-1, p. 522.

Table 13

General government current receipts
selected OECD Countries.
(% of GDP)

	1971	1980	1989
USA	28.2	30.8	31.8
Japan	21.6	27.6	33.4
Germany	39.4	44.9	45.0
France	37.7	44.5	46.4
Italy	31.1	33.0	41.1
UK	38.3	39.9	40.2
Canada	34.7	36.2	40.1
Netherlands	43.3	52.8	49.9
Sweden	49.4	56.3	64.2
Switzerland	26.2	32.8	34.1
Total OECD less USA	33.6	38.4	40.3

Source, *OECD Economic Outlook, 52*, December 1992

Table 14

U.S.A. Government expenditures, 1947-1992
(% of GDP)

	General Government spending[a]	Net interest	Federal spending	Federal soc. sec and medicare	State and Local spending from own sources[a]
1947	20.4 (NA)	1.9	15.5 (NA)	0.2	4.9 (NA)
1960	26.1 (19.7)	1.4	18.3 (11.0)	2.3	7.8 (8.7)
1970	29.7 (21.3)	1.3	19.9 (10.2)	3.7	9.8 (11.1)
1980	31.5 (18.6)	1.3	22.3 (7.6)	5.7	9.2 (11.0)
1985	33.0 (19.0)	2.3	23.9 (8.4)	6.5	9.2 (10.6)
1990	33.0 (18.8)	2.4	22.9 (7.6)	6.5	10.1 (11.2)
1991	34.1 (19.2)	2.6	23.5 (7.9)	6.8	10.6 (11.3)
1992	34.4 (NA)	2.6	23.5 (NA)	7.1	10.9 (NA)

a) Purchases of final goods and services in brackets.
Source: Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future*, January 1993.