The Economic Consequences of U.S. Government Debt

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Henning Bohn
University of California Santa Barbara

The conventional wisdom about the effects of government debt is well summarized in survey articles (e.g., Elmendorf and Mankiw 1999). I will review these effects briefly and then focus on problems of solvency and credibility. Given the short maturity of U.S. public debt – over $2.5 trillion maturing in 2010 – investor expectations are critical. To refinance its debt, the government must ensure that bond buyers remain firmly convinced of the government's solvency.

Conventional Effects

Standard macro theories of government debt assume a world with well-functioning financial markets. Debt is issued to finance budget deficits. Unless private saving rise by an offsetting amount, the increased supply of government bonds raises interest rates. Higher interest rates raise the required return on private borrowing and thereby crowd out capital investment. A lower capital stock reduces the economy's productive capacity and thus reduces future GDP. The damage is magnified if debt service requires distortionary taxes. If debt attracts foreign buyers, the interest rate and implied crowding-out effects are dampened, but then payments to foreign lenders reduce future GNP. Either way, debt accumulation reduces future consumption opportunities.

A vast empirical literature has examined the strength of these effects. The most striking general insight is that significant effects are remarkably difficult to find. A

leading explanation is Ricardian Neutrality, the hypothesis that private savings increase one-for-one with government debt because households recognize that debt implies future taxes. Studies of tax rebates find that consumers typically save a large fraction of a tax rebate. Shapiro and Slemrod (2009) suggest savings of two-thirds. Only the remainder—the deviation from neutrality—exerts upward pressure on interest rates.

Interest rates effects are nonetheless significant. Engen and Hubbard (2005) provide estimates for a range of specifications. They find that a one-percentage point increase in 5-year-ahead CBO projections of debt/GDP raises the 10-year Treasury yield by 2.8 basis points (bp). This estimate is significant at the 10% level and economically sensible, but subject to specification uncertainty. In vector autoregressions, the interest rate effect is only 1.5 bp.

Because the transmission mechanism for other macro effects goes through interest rates, the interest rate effect puts an upper bound on crowding-out and output effects. Elmendorf and Mankiw (1999) calculate that a 50%-of-GDP increase in debt would reduce national income in the long run by only about 3%. Though these effects of debt are harmful, they are arguably modest in size.

Government as Financial Intermediary

A government that allows its citizens/tax payers to defer taxes is effectively providing credit. If this credit is financed by debt, government is acting as financial intermediary. This role is well recognized in special cases, such as student loans, but applies to all public debt. Thus debt matters even if the conventional macro effects are modest.

Government debt has also generational elements, as it effectively allows the old to leave negative bequests. However, intergenerational transfers are a broader issue and do

not require public debt. Hence it is instructive to think about government debt in banking terms.

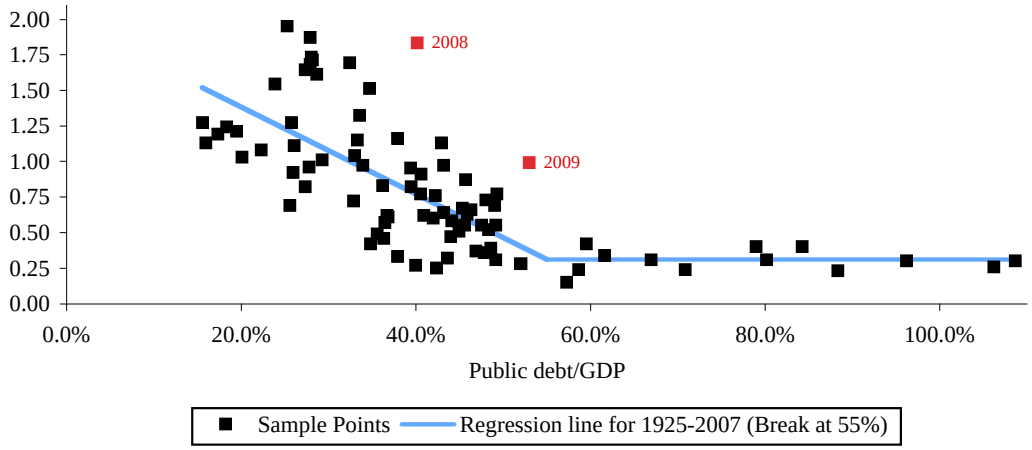
The most relevant measure is then the public debt (a.k.a. net debt). Government-held debt and other obligations, such as Social Security and Medicare, may matter indirectly as they influence the resources available to service the public debt.

Government acting as intermediary raises several questions: What is the value-added, and how does it vary with debt? What are the limits? What are the risks?

A first key question is to what extent government has an inherent cost advantage over private intermediaries, either due to superior debt-collection powers (the IRS) or because government bonds have a "special" collateral or liquidity value. The answer determines the value-added of government intermediation and it matters for the government's ability (or inability) to float unbacked debt. Specialness should be distinguished from mere safety. Safe assets—defined broadly to include nominal debt—are usually valued under the same stochastic pricing kernel as risky assets. An asset is special if its price is greater than the usual present value. Thus specialness is similar to the medium of exchange value of money.

Specialness of debt is based on scarcity and therefore likely to erode with rising debt. Recent work by Krishnamurthy and Vissing-Jorgensen (2008) documents that the spread between AAA-corporate and Treasury yields varies negatively with the debt-GDP ratio. As I find their non-linear regressions difficult to interpret, I have used the same data to estimate a simple truncated linear regression. Figure 1 shows the regression line for 1925-2007 (end of fiscal year values) and a scatter plot with values up to 2009.

Figure 1: The debt-GDP ratio and the AAA-Treasury yield spread



The AAA-Treasury spread reflects safety as well as specialness, because even AAA corporations are not entirely default-free. The negative slope nonetheless suggests that specialness matters.

The declining spread documents an adverse consequence of high public debt. The fitted line in Figure 1 has a slope of -3.06bp, declining from 152bp at 16% debt/GDP (the sample min.) to 31bp at 55% debt/GDP. For 2008-09, the spread is above normal. Debt projections for 2010 (about 60%) are already in the flat range. Further increases in debt are not likely to reduce the spread—the damage to specialness is already done.

The spread regression also implies that rising debt has a smaller impact on AAA than Treasury rates. Though the data and sample differ from Engen/Hubbard, the 3bp slope is similar to their estimates, suggesting that the impact of public debt on private borrowers may be closed zero, which raises new questions about crowding out.

One may suspect that the 31bp spread for debt/GDP over 55% is mostly risk-related. Regardless of interpretation, the spread provides an upper bound on specialness and shows that most of the equity premium must be attributed to risk.

Because most taxpayers would pay interest rates higher than AAA, private benefits from government intermediation are greater than the AAA-Treasury spread. Because the government inevitably extends "credit" to citizens who avoid repayment, debt financing involves redistribution. Cukierman and Meltzer (1989) provide an excellent political-economy analysis of the intergenerational aspects; similar logic applies at shorter horizons. Public debt yields private benefits to those who would otherwise face credit limits or pay risk premiums. Social gains arise if the government faces lower borrowing cost than private intermediaries.

Requirements of Debt Sustainability

A second key question is what limits government debt. Can governments grant unbounded credit to its citizens? A plausible consequence of rising debt is a growing concern about monetization and default. Ratings agencies routinely use debt/GDP and related ratios, such a debt/revenues, to determine sovereign credit ratings.

It is instructive to distinguish fundamental questions about debt sustainability from expectational questions about confidence crises and credibility.

Consider fundamentals for now. Coherent answers about debt sustainability require several layers of analysis. First one must reject the still-popular notion that there is a free lunch, an opportunity for governments to issue debt without ever providing debt service by simply rolling it over with interest (a.k.a. Ponzi finance). Second, one must ensure that the intertemporal budget constraint is satisfied. Third, one must worry about the government's ability to provide the required debt service even under adverse conditions, which imposes additional constraints.

The possibility of rolling-over the debt with interest cannot be dismissed lightly because the average interest charge on U.S. public debt has been below the average growth rate of the U.S. economy; e.g., 4.4% nominal interest vs. 5.5% growth for 1792-2009, and 4.8% interest vs. 6.8% growth for 1915-2009 (Bohn 2008, updated). The U.S. economy is nonetheless dynamically efficient, as the average real return to capital (about 6-7%) exceeds the real growth rate of the economy. The low interest rates on public debt reflect the risk-aversion of investors who accept a low expected real return in exchange for the safety of government bonds.

Economic theory then implies that fiscal policy is subject to an intertemporal budget constraint and a limit condition on public debt. Rational investors will refuse to buy government bonds unless policy satisfies the relevant conditions.

The intertemporal budget constraint requires specifically that current and future primary budget surpluses—revenues minus non-interest outlays—have a risk-adjusted present value that adds up to the value of current public debt. Thus *debt service cannot be avoided*. Risk-adjustment implies that present values depend not only on expected values but also on covariances with systematic risk (marginal utility).

Average primary surpluses can be low or negative if they co-vary positively with systematic risk. U.S. primary surpluses have indeed been negative, e.g., -0.3% of GDP for 1792-2009 and -1.15% for 1915-2009. The common claim that debt must be backed by expected primary surpluses is not quite correct. In the U.S., the public debt is backed entirely by the covariance terms in the intertemporal budget constraint that capture the value of safety promised to bond holders.

A basic requirement for sustainability in a stochastic setting is responsiveness to economic shocks that disturb the debt-GDP ratio. Whenever unexpected spending needs arise or the debt-GDP ratio rises due to low economic growth, fiscal policy must act to restore the equality of debt and the present value of primary surpluses. Such action can take many forms. One systematic and sufficient response is a fiscal reaction function for primary surpluses with positive coefficient on the debt-GDP ratio (Bohn 1998).

Historically, U.S. primary surpluses have responded positively to increases in debt. The response coefficient of primary surplus/GDP to debt/GDP ranges from 0.05 to 0.12, depending on sample period and specification (Bohn 1998, 2008). Vector autoregressions have found similar responses (Canzoneri et al. 2001). Thus U.S. fiscal policy has been consistent with the intertemporal budget constraint.

The link between primary surpluses and debt is not mechanical. U.S. primary balances have responded negatively to output gaps and to above-normal military spending; and there is residual variance. Thus fiscal reaction functions are consistent with cyclical stabilization and they can accommodate wartime needs.

Monetization and seignorage have not played a major role. Giannitsarou and Scott (2008) have used a cointegration approach to examine how fiscal imbalances are typically resolved. In 1960-2005 U.S. data, imbalances were resolved by almost entirely by responses in the primary surplus—about equally by higher taxes and reduced spending—and not by inflation. Seignorage is reflected in Federal Reserve transfers to the Treasury. It averaged 0.16% of GDP for 1915-2009 and is included in the budget. If this revenue were excluded, the average primary deficit would be 1.31% instead of 1.15% of GDP—a minor change. These findings do not preclude an insurance role for nominal

debt. Nominal debt helps to reduce changes in debt/GDP by exploiting the negative correlation between inflation and GDP (Bohn 1990). Questions of monetization versus primary surplus responses are about the remaining (unhedged) changes in debt/GDP.

Reinhart and Rogoff (2010) suggest a link between inflation and the ratio of gross debt to GDP. They find high inflation when debt/GDP exceeds 90% and low inflation for debt/GDP under 30%. However, gross debt exceeded 90% of GDP only in the years surrounding WWII (fiscal 1944-50), so inflation reflects in part the jump in CPI as price controls were lifted at the end of WWII. A gross debt/GDP under 30% is a proxy for the Gold Standard. For the fiat money period of 1934-2009, the correlation of debt/GDP and inflation is insignificant with negative sign.

To be meticulous, the budget constraint should be adjusted if debt has a special collateral or liquidity value. One consistent approach is to value debt and primary surpluses under the regular pricing kernel and to count cost-savings from specialness as revenue item. If measured generously by attributing the entire AAA-Treasury spread to specialness, the revenue averages 0.27% of GDP for 1915-2009. The average primary balance would remain negative at -0.88%—not much changed.

In summary, the foundation of U.S. debt policy is the promise of safety for bondholders backed by primary surpluses only in response to a high debt-GDP ratio.

Implications of Safe Debt

An obvious attraction of the safe debt policy is that it provides cheap financing for entrepreneurial Americans. It is fitting that Americans hold foreign equities financed by debt and that almost half the Treasury debt is held abroad. Moreover, U.S. debt

management has an element of riding the yield curve—using T-bills to finance long-term borrowings. This reduces expected cost further, but at the expense of refinancing risk.

A serious downside of this policy is its welfare cost in a scenario of prolonged low or negative economic growth. Low growth would drive up the debt-GDP ratio and eventually require sustained primary surpluses—tax increases or spending cuts—and this in a difficult economic situation. The U.S. has never fully experienced this downside. The worst low-growth episode, the Great Depression, was ended by WWII with debt/GDP under 50%. Post-1990 Japan is a better illustration.

The dynamics of safe debt implies that slow growth causes a high debt/GDP ratio. Reinhart and Rogoff (2010) find low growth conditional on gross debt over 90% of GDP, in the US and abroad, and they suggest high debt might hurt growth. This conclusion seems unwarranted, at least for the U.S., where gross debt exceeded 90% of GDP only in fiscal years 1944-50. The obvious causal factor is WWII, with demobilization at the end reducing measured growth. In Japan, gross debt/GDP started off at 68% in 1990 (net debt 15%) and breached 90% only after a period of slow growth.

Another concern is a potential for communication failure. A positive response of primary surpluses to debt is sufficient to make the debt-GDP ratio stationary, but it does not preclude episodes with high debt in response to negative shocks. Such episodes test the government's credibility because the fiscal benefits from defaulting and from inflating nominal debt are increasing in the level of debt. This concern touches a more general problem: the challenge of managing expectations.

The Challenge of Managing Expectations

Rational investors are forward looking. Policies can change. Hence investors may worry about debt repayment in the future even in a country with a long history of fiscal sustainability and no defaults.

Two distinct issues deserve attention: the possibility of a confidence crisis based on self-fulfilling expectations; and concerns about a structural break in policy that might trigger monetization or lead to insolvency in the long run.

A confidence crisis is a concern because the U.S. Treasury relies on serial refinancing as it issues short-term debt backed by tax revenues in the far future. The government is in effect operating like a bank and therefore subject to bank runs. In game theoretic terms, a confidence crisis can occur even along an otherwise sustainable path if the market for debt has multiple equilibria.

For instance, consider Treasury debt in December 2009: Treasury bills, all maturing in 2010, account for $1.79 trillion or 23% of the $7.8 trillion publicly held debt. Also due in 2010 are $713b principal payments on maturing notes and bonds and $168b coupon payments, adding up to a cash flow requirement of $2.68 trillion. Budgeted 2010 revenues are less $2.2 trillion. This places U.S. debt into Cole and Kehoe's (2000) "crisis zone," a range where self-fulfilling debt crises are possible.

Most models of confidence crises assume that there is one "good" equilibrium, where investors expect no default and refinance the debt at default-free interest rates. This is an equilibrium if government satisfies its intertemporal budget constraint and does not intend to default when financing is available. In the crisis zone, there is also a "bad" equilibrium. If investors expect a default and refuse to refinance, their expectations will

be confirmed. Default is unavoidable without access to refinancing. One could speculate about the aftermath of such a default—say, ask if a refusal to refinance is rational if a suspension of payments were followed by sufficient payoffs later—but experience suggests that fears of illiquidity are destructive. (A recent example is the collapse of the auction rate securities market.)

In a broader sense, the existence of a bad equilibrium depends on the Federal Reserve, because as last resort, the Federal Reserve could monetize the debt. The logic follows Sargent and Wallace's (1981) famously unpleasant monetarist arithmetic, but applied to a path off the desired equilibrium. Because the U.S. government is undoubtedly too big to fail, a bailout is likely. Thus a default is unlikely. However, monetization points to a high-inflation "bad" equilibrium as modeled by Calvo (1988): Investors who expect high inflation may demand interest rates that are prohibitive at normal inflation rates. Monetization conditional on refinancing problems could rationalize such expectations. The result would be a jump in interest rates, an expansion in high-powered money, and likely a sharp drop in the dollar.

The rationality of a speculative attack depends on how the Federal Reserve and the Treasury would handle a failed auction. One contingency plan might be to issue long-term inflation-indexed securities to avoid or quickly reverse monetization. Inflation-indexed bond are senior to nominal debt if a refinancing cutoff is known to trigger monetization and not default. A maturity ladder that distributes real debt service uniformly over a long horizon would remove the necessity of future refinancing. Hence inflation-indexed bonds should be marketable even in a confidence crisis. Given this option, an investor refusal to refinance would not be rational.

A high level of debt would complicate a confidence crisis. However, the danger of a confidence crisis depend less on the level of debt than on debt structure and contingency planning. (I trust Treasury has thought this through.) In addition, the U.S. government's track record—AAA rating, history of sustainable policies, and no defaults—ensures that the good equilibrium is the focal point for coordinating investor expectations.

Concerns about a structural break in fiscal policy could upset investor expectations. The financial problems of pay-go Social Security and Medicare are well known. Investors concerns are likely reinforced by official projections of persistent primary deficits even under optimistic assumptions, and by open-ended credit guarantees to mortgage lenders. Estimated fiscal reaction functions call for primary surpluses when the debt-GDP ratio rises above a critical value, which is around 55-60% under normal conditions. Projections that assume primary deficits at debt-GDP ratios well above this range are plausibly interpreted as signal of a structural break.

The nature and timing of a shift in investor expectations is difficult to determine. History shows that expectations can shift suddenly. Currently, the primary concern reported in the media is a fear of inflation as a consequence of rising debt.

Fiscal gains from inflation depend on debt structure and ownership. The over-90% non-indexed share and near-50% foreign ownership of U.S. debt favor inflation, but the short duration limits the gains. As of December 2009, 37% of marketable nominal debt was due within a year and 60% within three years. A jump in inflation to, say, 4% (a la Blanchard) sustained for 30 years would devalue the debt by about 5% of GDP. The gain would be greater if debt were higher. It is unclear, however, under what

conditions—if any—politicians would find the gains large enough to push the Fed into sacrificing price stability. Interestingly, advocates of higher inflation tend to invoke Phillips curve arguments and not fiscal gains. This suggests that to the extent politics influences inflation, it's more about jobs than about nominal debt.

If inflation fears were tightly related to debt, this should be reflected in spreads between nominal and inflation-indexed yields (implicit inflation). Between Feb.2007 (pre-crisis) and Feb.2010, CBO projections of 5-year-ahead debt/GDP doubled from 33% to 66%. But implicit inflation in 10-year yields was almost unchanged (about 2.3%). Thus the debt-inflation link is still more a perception than a reality.

Inflation fears are nonetheless difficult to dismiss because throughout history, countries in trouble have debased their currencies (Reinhart and Rogoff 2009). The logic of Sargent and Wallace (1981) provides theoretical support, and the fiscal theory of the price level is making inflationary solutions intellectually respectable.

Quantitatively, public debt is small relative to implicit pay-as-you-go obligations—$7.8 trillion versus $52 trillion closed-group liability for social insurance (mostly Social Security and Medicare; see U.S. financial statements). A credible plan to address pension and health care cost should help calm inflation fears. Credible cuts in projected deficits would be essential if a confidence crisis were triggered by doubts about fundamental solvency. (Then a shift to inflation indexing would not suffice. It could even fuel inflation fears because extracting a given inflation gain from a smaller nominal debt would require a higher rate of inflation.)

A note on credit default spreads is appropriate. How can one reconcile the alleged safety of U.S. debt with a positive CDS, recently around 35bp? Sovereign CDS for a

country with fiat currency are an odd creature. Treasury securities, which are normally the best collateral, would be devalued in the default event. Natural buyers—hyper risk-averse investors—should be hyper-concerned about counterparty risk. This suggests that collateral requirements and their dynamics are central, so the price may largely reflect the option value of claiming collateral in a panic. It should not be interpreted as default probability or as the value of a fundamental tail risk. To the extent U.S. credit default swaps do reflect fundamentals, the Federal Reserve should take pride for it would signal credibility in resisting monetization.

A Precautionary Argument for Low Debt

Yields on long-term inflation-indexed bonds, currently about 2.2%, are still below the long-run growth rate of the U.S. economy. Treasury bills are even less costly. This means the United States is in an extraordinarily privileged position, having access to credit in fiat currency and at interest rates that not require debt service except under unusual circumstances. Privileges are at risk when they are overused—and worth protecting.

A serious consequence of debt is to create reasonable doubts about the government's solvency and about monetary stability. This applies to public debt and to implicit obligations. There is a strong precautionary case for keeping government obligations low enough that the safety of U.S. debt is unquestionable.

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