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*Do Budget Deficits Push Up Interest Rates and Is This the  
Relevant Question?*

Marc Labonte, Government and Finance Division

January 2, 2008

**Abstract.** In reviewing the major theories of the budget deficits effect, this report explores the deficits effect on both interest rates and the nations welfare. It begins with the mainstream view, and then explains how other versions differ from that view.

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# Do Budget Deficits Push Up Interest Rates and Is This the Relevant Question?

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January 2, 2008

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## Summary

Persistent budget deficits have directed attention to their economic effect, particularly whether they raise interest rates. Any explanation of the budget deficit-interest rate relationship must first come to grips with an indisputable fact: budget deficits consume real resources, and this is the more relevant public policy concern. When the government borrows from the public to finance public spending or tax cuts, the resources must come from somewhere. In mainstream theory, the resources come from the nation's pool of saving, which pushes up interest rates for simple supply and demand reasons. As a result, the deficit "crowds out" private investment that was competing with government borrowing for the same pool of national saving. Since less investment reduces the future size of the economy, economists often describe deficits as placing a burden on future generations.

But other theories offer different explanations of where the resources come from that do not involve higher interest rates. In the capital mobility view, foreigners lend the United States the savings it needs to finance a deficit, leaving interest rates unaffected. But foreign capital can only enter the country through a trade deficit, leading to a decline in the output of U.S. exporting and import-competing industries. In an alternative theory, popularly known as the Barro-Ricardo view, forward-looking, rational, infinitely-lived individuals see that a budget deficit would result in higher taxes or lower government spending in the future. Therefore, they reduce their consumption and save more today. This provides the government with the saving needed to finance its deficit, placing no upward pressure on interest rates. Empirical evidence that budget deficits do not affect interest rates does not prove that government budget deficits do not impose a burden, as demonstrated by the capital mobility and Barro-Ricardo views. In the capital mobility view, deficits crowd out the trade sector of the economy; in the Barro-Ricardo view, they crowd out current private consumption. And in both of these views, deficits no longer have any stimulative effect on the economy.

Comparing changes in budget deficits to changes in interest rates is not a valid way to determine whether budget deficits affect interest rates. That is because there are many other factors that also affect interest rates, such as the state of the economy. To determine the effect of budget deficits on interest rates, these other factors must be held constant using statistical methods. Otherwise, the effect of budget deficits on interest rates could be misestimated or even reversed.

Empirical evidence on a link between budget deficits and interest rates is mixed. There is not a consensus among economists on how to model the economy and what relevant variables should be included. Therefore, conclusions drawn from empirical evidence vary widely. More recent evidence tends to find a stronger, positive relationship between the two. In addition, 10 major forecasting models all predict that a budget deficit would increase interest rates. According to Gale and Orszag (2002), the models predict that a budget deficit equal to 1% of GDP would increase interest rates, with a range of 0.1-1 (mean=0.52) percentage points after one year and 0.05-2 (mean=0.99) percentage points after 10 years. This report will be updated.

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## Introduction

Federal government budget deficits have been a concern of policymakers in recent years. One concern has been what effects these sustained deficits are having on the U.S. economy. Tax cut proponents have claimed that “deficits don’t matter,” in a phrase attributed to Vice President Cheney,<sup>1</sup> while deficit “hawks” claim that deficits raise interest rates, to the economy’s detriment. This is an important question because how effective tax cuts are in stimulating the economy depends on how the rest of the economy adjusts.<sup>2</sup> As this report explains, the adjustment can occur through interest rates, the trade balance, or private saving. This report reviews theoretical and empirical evidence to see what relationship exists between budget deficits and interest rates.

Unfortunately, simply observing whether interest rates are higher or lower in the presence of deficits is not a sufficient test of the hypothesis. That is because there are many other factors that are simultaneously affecting interest rates. These include the state of the economy, the saving behavior of individuals and companies, the investment opportunities of business, the state of financial markets, demographics, and the financial relationship between the United States and the rest of the world. In the real world, these factors cannot be held constant, so economists try to “control” for them statistically to separate out the effects of deficits. But controlling for other factors requires a theoretical model that explains and identifies how a deficit and those other factors affect interest rates. Thus, even those who are skeptical of theoretical explanations are dependent on theoretical models to translate the relationship from the empirical evidence. Because so many different models of the economy exist, some models offer positive evidence about the deficit-interest rate relationship while others offer evidence refuting the relationship.

Any explanation of the budget deficit-interest rate relationship must first come to grips with an indisputable fact: budget deficits consume real resources. When the government borrows from the public to finance public spending or tax cuts, the resources must come from somewhere. In mainstream theory, the resources come from the nation’s pool of saving, which pushes up interest rates for simple supply and demand reasons. This “crowds out” private investment that was competing with government borrowing for the same pool of national saving. But other theories offer different explanations of where the resources come from that do not involve higher interest rates.

Fundamentally, the effect of budget deficits on interest rates is only the proximate question that economists and policymakers wish to answer. The ultimate question is where the resources come from to finance a deficit, and what ramifications the use of those resources have for the nation’s welfare. A model in which budget deficits do not affect interest rates still has consequences for the nation’s welfare. In reviewing the major theories of the budget deficit’s effect, this report explores the deficit’s effect on both interest rates and the nation’s welfare. It begins with the mainstream view, and then explains how other versions differ from that view.

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<sup>1</sup> Ron Suskind, “Educating Paul O’Neill,” *Wall Street Journal*, Jan 12, 2004. p. B.1.

<sup>2</sup> For evidence on the tax cuts’ efficacy, see CRS Report RL32502, *What Effects Did the 2001 to 2003 Tax Cuts Have on the Economy?*, by Marc Labonte.

## Budget Deficits in the Mainstream View

In the mainstream economic view, budget deficits expand total spending (aggregate demand), and thereby short-term economic growth.<sup>3</sup> If a budget deficit is the result of higher government spending, the additional government spending expands aggregate spending directly. If a budget deficit is the result of tax cuts, aggregate spending is expanded by an increase in spending by the tax cut's recipients.<sup>4</sup>

In an economy operating at full employment, production (aggregate supply) cannot be increased to match the increase in spending because all of the economy's labor and capital resources are already in use. This mismatch between aggregate demand and aggregate supply must be resolved through market adjustment. Market adjustment takes place in four distinct ways, each of which has consequences for interest rates.

- The greater demand for goods and services pushes up prices, leading to a temporary increase in inflation. Because nominal interest rates are equal to real (inflation-adjusted) interest rates and the expected inflation rate, an increase in inflation (if anticipated) would push up nominal interest rates.
- If the Federal Reserve's objective is to maintain a stable inflation rate, as most observers believe, it will offset the rise in demand through a contraction in monetary policy. It will increase short-term real interest rates directly, and this will reduce interest-sensitive spending (i.e., private investment and consumer durables).
- In the market for savings, the demand for savings has increased for two reasons. First, because the government is now competing with private firms for the same pool of national saving to finance its deficit, the government has increased the demand for savings directly, and interest rates rise as a result. Higher interest rates make investment spending less profitable for private firms, and the budget deficit is thus said to have "crowded out" private investment. Second, in response to the greater demand for their goods, firms wish to increase their investment spending in order to increase their supply of goods. Investment demand increases in response to the desire for higher production, and interest rates rise as a result.<sup>5</sup>
- In the money market, the increase in aggregate spending leads to an increase in money demand. As a result, if monetary policy is left unchanged, interest rates increase since the opportunity cost of holding money is now greater. With higher interest rates, the same supply of money can now be used to purchase more

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<sup>3</sup> For more information, see CRS Report RL31235, *The Economics of the Federal Budget Deficit*, by Brian W. Cashell.

<sup>4</sup> Note that the increase in the budget deficit described here is due to policy changes, which is referred to as a change in the structural deficit. The change is not due to changes in economic conditions, such as a fall in tax revenue due to a fall in taxable income. When economic conditions cause tax revenues to fall, the actual deficit would rise but the structural deficit would be unchanged.

<sup>5</sup> The conventional model usually assumes that the household savings rate would be unaffected by a deficit-financed increase in government spending and that households would save a fixed percentage of a deficit-financed tax cut. Since the average household saving rate is low, it is usually assumed that the bulk of the tax cut would be spent. To the extent that households save a portion of a deficit-financed tax cut, there will be less crowding out (and stimulus) than a deficit-financed increase in government spending in the conventional model.

goods and services because people do not hold on to money as long (money velocity increases).

As a result of the interaction between these market forces, resources have been shifted toward the government (or tax cut recipients) and away from the saving of the private sector. This has consequences for the economy in the long run. In the long run, economic growth is dependent on increases in private investment, productivity, and the labor force. By identity, private investment equals national saving less the budget deficit (foreign saving will be considered below). *Thus, by reducing national saving, budget deficits lead to less private investment. This reduces the size of the economy in the long run, and future standards of living.*<sup>6</sup> If the deficit lasts for one year, there would be a one-time reduction in growth. If the deficit lasted for several years, it would reduce growth for the duration of that time.<sup>7</sup>

For this reason, economists often describe deficits as placing a burden on future generations. Deficits allow individuals to enjoy more consumption today. But since this higher consumption comes at the expense of lower saving, and hence lower investment, it reduces the size of the economy in the future. Thus, individuals would enjoy lower consumption in the future.<sup>8</sup>

## **The Conventional View With an Underemployed Economy**

Thus far, it has been assumed that the expansion in the budget deficit was taking place in an economy with fully employed resources. Since all of the economy's resources were already in use, for the government to redirect resources to itself or tax cut recipients required a reduction in the resources available to others. This reallocation occurred through higher prices and interest rates, the latter of which "crowded out" private investment and consumer durables.

But in an economy with underemployed labor and capital resources as a result of a recession or low growth, the financing of a budget deficit is no longer a zero-sum scenario in which any resources redirected to the government or tax cut recipients must be fully offset by a reduction in the purchasing power of others. That is because the increase in aggregate spending caused by the deficit leads to unemployed resources being brought back into use, generating new aggregate production to match the increase in aggregate spending. This is how expansionary fiscal policy "stimulates" the economy during a recession. In an extremely underemployed economy, enough unused resources are available to match the increase in aggregate spending entirely. The increase in the budget deficit would be "multiplied" by the fact that re-employed workers increase their spending as well, so that the total increase in aggregate spending is larger than the increase in the budget deficit. In this case, the budget deficit would be unlikely to have much of an effect on

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<sup>6</sup> If the deficit was used to finance public investment (e.g., highways), the effects on growth would be different. In this case, private investment would still be reduced by an equivalent amount but it would be shifted to public investment rather than public or private consumption. Whether this increased or decreased economic growth would depend on whether public investment was more or less productive than private investment.

<sup>7</sup> Budget deficits could also cause interest rates to rise if they caused the debt to grow at unsustainable rates, in which case investors would demand a risk premium to be induced to hold government debt for fear of default. Budget deficits have never grown large enough in the post-war period for this to be a relevant factor in the United States, where government debt has always been considered riskless. Risk premiums have been observed for foreign sovereign debt, however, particularly in the developing world. The crowding out argument outlined in this section is not related to risk premiums.

<sup>8</sup> For more information, see CRS Report RL30520, *The National Debt: Who Bears Its Burden?*, by Marc Labonte and Gail E. Makinen.

interest rates and inflation, as long as it were eliminated once the economy returned to full employment.<sup>9</sup>

The U.S. economy has not faced this extreme scenario since the Great Depression. In all recessions since the 1930s, including the last one, some underemployed resources have been available to be brought into use in response to an increase in aggregate spending, but not enough so that there would not be any increase in interest rates or prices within the framework of the conventional model. Thus, expansionary fiscal policy would cause some increase in aggregate spending, with larger increases the further the economy is from full employment. It would also cause some increase in interest rates and prices, but less than in a fully employed economy. During the past couple of years, the economy has been close to economists' estimate of full employment, so the effect of deficits on interest rates and prices would be expected to be greater.

If prices and markets do not adjust instantaneously and people's expectations do not change instantaneously, even at full employment it may be possible to temporarily bring additional resources into production, thereby generating some transient stimulus from an increase in the budget deficit. In other words, an increase in the deficit is unlikely to ever lead to zero increase in aggregate spending in the very short run. However, a deficit is likely to lead to a much smaller increase in output and larger increase in prices at full employment than in a recession. And after adjustment took place, the economy would return to full employment, with the same higher interest rates and prices as described in the previous section. Economists tend to disfavor attempts to push the economy above full employment in this way, since the inevitable move back down to full employment could result in overshooting in the opposite direction—recession.

## **Budget Deficits in The Mainstream View With Capital Mobility**

Thus far, the mainstream model described has used the assumption that the United States is a closed economy, in which trade and capital does not flow between it and the rest of the world. Relaxing this assumption has very important ramifications for interest rates.

In a closed economy, the pool of savings available to the government to finance its deficits and the private sector to finance its investment spending is fixed. For that reason, any increase in the demand for that savings must push up interest rates. But what if the firms and government of the United States could draw from the world pool of savings, rather than being limited to the national pool of savings? If the increase in the deficit were an insignificant fraction of world savings, it would have no effect on world interest rates.<sup>10</sup> Therefore, it would have no effect on U.S. interest rates because U.S. interest rates, adjusted for risk, would have to equal world interest rates. Any

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<sup>9</sup> In the previous section, one reason that budget deficits pushed up interest rates was because the pool of national savings was fixed. In the extreme case of an underemployed economy, budget deficits do not push up interest rates because the pool of national savings grows along with national income. As deficits bring resources back into production, income is generated, and some of that income will be saved, adding to national savings.

<sup>10</sup> It is often argued that deficits should not affect interest rates because they are an insignificant fraction of world wealth (or financial capital). This argument is not valid because interest rates are determined by current saving and investment, not wealth, which is a cumulative measure of past saving and investment, less depreciation. Although the assumption that the increase in the deficit is an insignificant fraction of world saving is made here for illustrative purposes, this assumption may be questionable for large deficits in reality.

time U.S. interest rates rose above (or fell below) world interest rates, in theory capital would enter (or leave) the country seeking to take advantage of the profit differential until the point where U.S. interest rates fell (rose) back to world levels.<sup>11</sup>

Although with perfect capital mobility, a deficit would have no effect on interest rates, a deficit would still have a cost to the economy. First, although the foreign capital inflows permit a larger U.S. capital stock than would otherwise exist, the returns from that capital would flow to foreigners rather than U.S. citizens. However, U.S. workers would benefit from the larger capital stock in the form of higher wages. The second cost comes from the effect the capital inflow has on the economy. For foreign capital to enter the country, foreigners must buy U.S. dollars. The increased demand for dollars causes the dollar exchange rate to appreciate. As the dollar appreciates, U.S. exports become less competitive abroad and U.S. import-competing firms become less competitive domestically. This causes the trade deficit to expand, which reduces aggregate spending in the economy. In a world of perfectly mobile capital, the expansion in the trade deficit would offset the expansion of fiscal policy one-to-one, so that fiscal stimulus had no net effect on aggregate spending. *By adding capital mobility, crowding out has not been eliminated, it has been shifted from the investment sector to the trade sector. Thus, although there is no effect on interest rates, fiscal policy in this scenario no longer has any stimulative effect on the economy.* Whereas the burden of deficits was borne by future generations in a closed economy, in the presence of perfect capital mobility, it is borne by U.S. exporters and import-competing firms.

## **The Response of Saving to Budget Deficits and the Barro-Ricardo View**

### **Saving in the Conventional View**

In the conventional view, simple assumptions are made about the behavior of private saving in response to a budget deficit. If the deficit is the result of a tax cut, the conventional view assumes that the tax cut's recipient would save a fraction of that tax cut and spend the rest. Although there is no direct way to measure how much of a tax cut recipients would be likely to save, since the average household saving rate is very low (it averaged 4.4% of GDP in the 1990s and 0.3% of GDP in 2006), it is typically assumed that tax cuts to individuals would be mostly spent. Therefore, the rise in private saving would be much smaller than the fall in public saving and little crowding out would be prevented.

“Supply siders” hold that the rise in private saving could be much greater than would be implied by looking at the average saving rate. If saving is highly sensitive to changes in interest rates, small increases in the after-tax rate of return (as a result of lower marginal tax rates) could lead to large increases in saving (technically, saving would be said to have a high and positive interest

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<sup>11</sup> Technically, this is referred to as an arbitrage condition. If interest rates did not equalize, arbitrageurs could make unlimited profits by selling (buying) foreign securities and buying (selling) U.S. securities. By attempting to exploit unlimited profit opportunities, the arbitrageurs eliminate the interest rate differential.

This example also holds economic conditions in other countries constant. If other countries interest rates rose or fell in step with ours (because they were pursuing the same policies, for example), then there would be no interest rate differential and no resulting capital flow/ trade deficit.

elasticity). If the interest elasticity of saving were great enough, this would keep the budget deficit from causing large changes in interest rates, and hence investment.<sup>12</sup> Yet a look at the long-run behavior of private saving in this country casts doubt upon the assertion that small changes in tax rates could generate large changes in the private saving rate. The corporate saving rate has been relatively constant in the post-war period, while the household saving rate has dropped considerably in the past two decades. The downward trend in the household saving rate has occurred during a period with many changes in marginal tax rates, including large reductions in top marginal income tax rates, marginal tax rates on investment income, and the expansion of tax-preferred savings vehicles in the 1980s and the 2000s.<sup>13</sup>

It is also worth considering, from a theoretical perspective, that private saving could be sensitive to interest rates in the opposite way. Rather than saving more in response to higher interest rates, individuals could save less. If individuals are primarily target savers, saving to meet a goal such as owning a house, car, or to support a certain standard of living in retirement, higher interest rates would make that goal easier to meet. This would cause them to save less in response to a budget deficit, making the deficit's negative effect on long run growth even greater than under the conventional view. Thus, even if incentives are an important determinant of saving behavior, it is not clear in which direction the incentives cause behavior to react. And there is no straightforward evidence to suggest which view is correct. Indeed, the rapidly rising stock market in the late 1990s coincided with a decline in the household savings rate to nearly zero, as the target-saver view would predict.

## **Saving in the Barro-Ricardo View**

Are there explanations that suggest a larger private saving response to a budget deficit? Some economists complain that the explanation of how savers react to changes in the government's fiscal position is not well developed in the mainstream view. There is no explanation of how today's policy decisions affect the future, and how individuals incorporate their perceptions of the future into their plans today. The Barro-Ricardo view, named after the 19<sup>th</sup> century economist David Ricardo, and Robert Barro who revived and developed Ricardo's theory, addresses this issue.<sup>14</sup> Based on a very particular set of assumptions, Barro showed how deficits could have no effect on interest rates. Barro assumed that people were perfectly rational, planned their lifetime consumption through optimization, had infinite life spans (he suggested that concern for offspring on par with one's own well-being could substitute for infinite life spans in reality), could borrow against future earnings without limit, and were all taxed equally. If the deficit finances government purchases, those purchases must be perfect substitutes for private consumption. He assumed that if the deficit finances tax cuts, the tax cut was lump-sum in nature, so that incentives to work or save are not changed.

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<sup>12</sup> It should be noted that if this view is correct, then tax cuts would be significantly less stimulative than government spending when the economy is below full employment. That is because the portion of a tax cut that is saved is not contributing to an increase in aggregate spending. For more information, see CRS Report RS21136, *Government Spending or Tax Reduction: Which Might Add More Stimulus to the Economy?*, by Marc Labonte.

<sup>13</sup> For more information, see CRS Report RL30873, *Saving in the United States: How Has It Changed and Why Is It Important?*, by Brian W. Cashell and Gail E. Makinen.

<sup>14</sup> This view is also referred to as "Ricardian Equivalence." Robert Barro, "Are Government Bonds Net Wealth?," *Journal of Political Economy*, vol. 82, no. 6 (Nov/Dec 1974), p. 1095. For an overview of the issues raised in the debate on the Barro-Ricardo Theory, see John Seater, "Ricardian Equivalence," *Journal of Economic Literature*, vol. 31, no. 1 (March 1993), p. 142.

Under these circumstances, he reasoned, individuals would know that any increase in the budget deficit would have to be offset by an increase in their tax burden or decrease in their government services in the future.<sup>15</sup> In light of the larger deficit, their previous lifetime consumption plan would lead to too much consumption today and too little in the future. To make up for the reduction in future consumption brought about by the deficit, they would save more now. Thus, as the government placed greater demand on the nation's savings, the pool of savings would expand, so that no upward pressure was placed on interest rates. Since interest rates and investment levels are the same, long-term growth would be the same. This also means that an increase in the budget deficit would have no short-run stimulative effect on the economy since national saving (and thus aggregate spending) has stayed the same—*the stimulus provided by the government has been offset by a contraction in private spending.*

As can be seen, the fact that interest rates do not rise in the Barro-Ricardo view *does not mean that deficits can be financed without using any resources.* Instead of transferring resources from the investment sector (as in the conventional view), or the trade sector (as in the capital mobility view), the resources are transferred from private consumption. In this sense, the effect of a deficit under the Barro-Ricardo view is similar to a tax increase: resources are transferred to the government through a reduction in private consumption.

The Barro-Ricardo view has a clear advantage over the conventional view: it offers an explanation for how individuals adjust their saving behavior to take into account fiscal policy. But the strict conditions adopted to make this explanation tractable are also its greatest weakness. If any of the highly exacting prerequisites are weakened, the results may no longer hold. For example, what if individuals do not plan out their lifetime consumption because of uncertainty or myopia? What if individuals do not understand the link between deficits and their future welfare? Or what if individuals, who in real life are not all the same, think that someone else will get stuck with the bill? For example, nobody's lifespan is infinite and not everyone has children. Under any of these cases, individuals would no longer increase their saving enough to match the increased demands placed on national saving by the budget deficits. Therefore, the Barro-Ricardo view would not hold and deficits would cause interest rates to rise.

## Empirical Evidence

Comparing changes in budget deficits to changes in interest rates is not a valid way to determine whether budget deficits affect interest rates. That is because there are many other factors that affect interest rates. To determine the effect of budget deficits on interest rates, these other factors must be held constant using statistical methods. Otherwise, the effect of budget deficits on interest rates could be mis-estimated or even reversed. For example, interest rates often fall during recessions since investment demand is reduced and precautionary saving may rise. If the business cycle has a greater effect on interest rates than budget deficits, and changes in the budget deficit (more specifically, changes in the structural deficit) happen to coincide with recessions, a simple comparison of deficits and interest rates would suggest that deficits cause interest rates to

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<sup>15</sup> In a later paper, Barro drew a distinction between anticipated and unanticipated increases in the budget deficit. He reasoned that the Barro-Ricardo view of zero effect of deficits on the economy and interest rates held for anticipated increases in the budget deficit. Unanticipated increases, by contrast, could have real effects on the economy and interest rates. Robert Barro, "Federal Deficit Policy and the Effects of Public Debt Shocks," *Journal of Money, Credit, and Banking*, vol. 12, no. 4 (1980), p. 747.

fall. In reality it is the recession that is causing interest rates to fall, and after controlling for the recession, very different results may be achieved.<sup>16</sup>

It should also be stressed that empirical evidence that budget deficits do not affect interest rates does not demonstrate that government budget deficits are burdenless. Empirical tests of the effects of deficits on interest rates are only tests of the conventional view without capital mobility. The capital mobility view and Barro-Ricardo view both explain how deficits could have no effect on interest rates, and yet the deficits still impose a burden in both views. In the capital mobility view, they crowd out the trade sector of the economy; in the Barro-Ricardo view, they crowd out current private consumption.

Over the past two decades, there have been dozens of econometric studies estimating the effects of budget deficits on interest rates. The studies have reached very different conclusions because they have covered different periods, included different variables, and modeled the relationship between the variables and interest rates differently. Seemingly insignificant changes in the structure of the model, such as how long a deficit should affect interest rates, how deficits and interest rates are defined, and the mathematical form used to represent the relationship can drastically change the results. Not only do variations in the model used lead to different results, but some researchers make assumptions at odds with theory. These include the use of the actual budget deficit rather than the structural deficit, the effect of debt on interest rates instead of the deficit, the use of nominal instead of real interest rates, the omission of foreign capital flows, and so on. Another problem with the statistical method used in all of the studies reviewed, time series analysis, is that there can be no fundamental change in the economic regime over the time period for the results to be valid. Yet many studies commingled data from both the fixed and floating exchange rate period; the period in which capital mobility has been relatively free and the period that used capital controls; the 1970s, in which the Fed arguably tolerated high inflation, and the period since, when it did not. Some studies even included World War II, although this period featured the rationing of goods and credit, price controls, and the fixing of interest rates by the Federal Reserve.

Rather than review all of these studies, this report will summarize the results of three literature reviews. In 1991, Barth et al. published a literature review of 42 papers exploring the link between deficits and interest rates.<sup>17</sup> They found the evidence to be mixed, with 17 studies finding deficits to have a positive and statistically significant effect on interest rates, 6 having mixed effects, and 19 having statistically insignificant or negative effects. Some studies with a positive relationship estimated that the effect of a deficit equal to 1% of GNP could increase interest rates as much 0.4-1.2 percentage points. Summarizing the studies, the authors reach a number of conclusions:

- More of an effect is found on long-term interest rates than short-term rates. This makes sense since overnight rates are targeted by the Federal Reserve, and thus heavily influenced by monetary policy in the short run.
- Changes in structural budget deficits have more of an effect on interest rates than changes in the actual budget deficit. The structural (full-employment) deficit is a

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<sup>16</sup> This would be similar to claiming that men are fatter than women because on average men weigh more than women, without controlling for the fact that men are on average taller than women.

<sup>17</sup> James Barth et al., "The Effects of Federal Budget Deficits on Interest Rates and the Composition of Domestic Output," in Rudolph Penner, ed., *The Great Fiscal Experiment* (Washington DC: Urban Institute, 1991), p. 69.

measure of the deficit that eliminates the effects of the business cycle on the budget. A downturn in economic activity automatically causes revenues to fall as taxable income falls and certain types of government expenditures, such as unemployment benefits, to rise. Using the actual budget deficit in a statistical study would skew the results because the actual deficit is being determined in part by the same factors (the state of the economy) that are determining interest rates. Using the structural budget deficit or advanced statistical techniques avoids this problem.

- A link between deficits and interest rates is less likely to be found when high frequency (monthly or quarterly) data are used. This makes sense given how “noisy” (volatile) high frequency data tend to be.
- An effect is more likely to be found if a study uses a measure of the expectation of future deficits rather than contemporaneous deficits. This makes sense if investors are rational and forward looking—investors are not only concerned about what will happen today, but also what will happen in the future. However, the proper measure of future deficits is controversial. The CBO baseline is not a proper measure since it is an extension of current policy, and thus not a “best guess” of future policy.
- The link between deficits and interest rates is better established when the deficits finance government spending than when they finance tax cuts. The effect of a tax cut on interest rates would be expected to be smaller if tax cut recipients save some of the proceeds of the tax cut.
- Studies using a statistical method called vector-autoregression consistently found deficits to have no effect on interest rates. Basically, the vector-autoregression uses a small number of variables and makes no attempt to identify the theoretical relationship between the variables. This method has advantages and disadvantages—it would not be as accurate as an estimation of the correct theoretical model, but given the lack of consensus over what the correct model is, it may be more accurate than an incorrect theoretical model. It is not a method that can control for investors’ expectations of future deficits, which is a drawback if this an important factor.

They conclude that

Since the available evidence on the effects of deficits is mixed, one cannot say with complete confidence that budget deficits raise interest rates and reduce saving and capital formation. But equally important, one cannot say that they do not have effects.<sup>18</sup>

This conclusion seems apt given the balanced range of results in the studies they surveyed. They also look at studies that attempt to estimate whether deficits crowd out investment, the trade sector, or consumption, and find the results of these studies to be mixed as well.

A Joint Economic Committee study surveyed many of the same studies.<sup>19</sup> It surveyed five articles, all of which were included in the Barth survey, on the relationship between deficits and

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<sup>18</sup> Ibid, p. 94.

<sup>19</sup> Robert O’Quinn, *Fiscal Policy Choices: Examining the Empirical Evidence*, Joint Economic Committee, (Washington, DC: November 2001).

interest rates, all five of which found the relationship to be negative or statistically insignificant. It also surveyed 15 articles on the relationship between deficits and consumption, which the study took to be a test of the Barro-Ricardo theory, and found that seven studies supported the Barro-Ricardo theory and eight rejected it.

Gale and Orszag review journal articles written on the subject in the 1990s, since the Barth paper was published.<sup>20</sup> They find that of the 16 studies published since the Barth paper, 11 found that deficits had a positive and statistically significant effect on interest rates, five had mixed effects, and none found statistically insignificant or negative effects. This evidence is quite a bit stronger than the evidence found in the Barth review, and they attribute the change in outcome to some changes in research techniques, which they believe to be superior to earlier studies. (The studies also covered several more years of data.) Specifically, they believe the more recent studies to be superior because all of the recent studies focus on changes in long-term budget forecasts rather than current-year deficit totals and because they differentiate between long-term interest rates and short-term interest rates. These developments seem consistent with the expectations theory of interest rates, which suggests that long-term interest rates are determined by a combination of today's short-term interest rates and investors' perception of future short-term rates. Long-term deficits would therefore have a greater effect on interest rates than a temporary deficit. Short-term rates may also offer misleading evidence since they are so heavily influenced by the Fed, which targets overnight interest rates.

Gale and Orszag also examined the effects of a budget deficit on interest rates in 10 leading macroeconomic forecasting models, including the models of DRI, Macroeconomic Advisers, CBO, and the Federal Reserve. In all 10 models, a budget deficit equal to 1% of GDP would increase interest rates, with a range of 0.1 to 1.0 (mean=0.52) percentage points after one year and 0.05 to 2.0 (mean=0.99) percentage points after 10 years. It is striking that all forecasters, with reputational and profit motives to produce the most accurate results, use models in which deficits increase interest rates.

## Conclusions

Any explanation of the budget deficit-interest rate relationship must first come to grips with an indisputable fact: budget deficits are financed through the use of real resources. When the government borrows from the public to finance public spending or tax cuts, the resources must come from somewhere. In mainstream economic theory, the resources come from the nation's pool of saving, which pushes up interest rates for simple supply and demand reasons. This "crowds out" private investment which was competing with government borrowing for the same pool of national saving. Because less investment leads to a smaller economy in the future, economists often describe deficits as placing a burden on future generations.

But other theories offer different explanations of where the resources come from that do not involve higher interest rates. In the capital mobility view, foreigners lend the United States the saving it needs to finance a deficit, leaving interest rates unaffected. But foreign capital can only enter the country through a trade deficit, leading to a decline in the output of U.S. exporting and import-competing industries. In the Barro-Ricardo view, forward-looking, rational, infinitely-

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<sup>20</sup> William Gale and Peter Orszag, "The Economic Effects of Long-Term Fiscal Discipline," Urban Institute-Brookings Tax Policy Center Discussion Paper, December 2002.

lived individuals see that a budget deficit would result in higher taxes or lower government spending in the future. Therefore, they reduce their consumption and save more today. This provides the government with the saving needed to finance its deficit, placing no upward pressure on interest rates. Although theoretically compelling, the very particular assumptions made in the Barro-Ricardo view (such as infinite lifespans) lead one to question its practicality as an explanation of the real world.

Fundamentally, the effect of budget deficits on interest rates is only the proximate question that economists and policymakers wish to answer. The ultimate question is where the resources come from to finance a deficit, and what ramifications the use of those resources have for the nation's welfare. Empirical evidence that budget deficits do not affect interest rates is not evidence that government budget deficits do not impose a burden. The capital mobility view and Barro-Ricardo view both explain how deficits could have no effect on interest rates, and yet still impose a burden in both views. In the capital mobility view, they crowd out the trade sector of the economy; in the Barro-Ricardo view, they crowd out current private consumption. Ironically, the conventional view is the only one which suggests that deficits can stimulate aggregate spending in the short run, so rising interest rates would be a positive sign for policymakers attempting to stimulate the economy that they have succeeded.

Simply comparing changes in budget deficits to changes in interest rates is not a valid way to determine whether budget deficits affect interest rates because there are many other factors that simultaneously affect interest rates. These include the state of the economy, the saving behavior of individuals and companies, the investment opportunities of business, the state of financial markets, demographics, and the financial relationship between the United States and the rest of the world. To determine the effect of budget deficits on interest rates, one must hold these other factors constant using statistical methods. Otherwise, the effect of budget deficits on interest rates could be misestimated or even reversed.

But controlling for other factors requires a model that explains how a deficit and those other factors affect interest rates. Thus, even those who are skeptical of theoretical explanations are dependent on theoretical models to glean the relationship from the empirical evidence. Because so many different models of the economy exist, the empirical evidence is mixed, with some models offering positive evidence about the deficit-interest rate relationship while others offer evidence refuting the relationship. Some studies are questionable because they make assumptions at odds with the underlying theory (e.g., measuring the relationship of interest rates and debt, rather than deficits). Gale and Orszag (2002) argue that more recent evidence tends to find a stronger, positive relationship between the two, with all sixteen of the studies they surveyed finding positive or mixed evidence. In addition, 10 major forecasting models all predict that a budget deficit would increase interest rates. According to Gale and Orszag (2002), the models predict that a budget deficit equal to 1% of GDP would increase interest rates, with a range of 0.1 to 1.0 (mean=0.52) percentage points after one year and 0.05 to 2.0 (mean=0.99) percentage points after 10 years.

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