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The Ricardian Model of Budget Deficits

ROBERT J. BARRO

My wife was watching C-Span on television, and one of the economists from the Congressional Budget Office (CBO) was talking about the U.S. budget deficit. He said that the deficit was a major crisis, but people were being misled about the severity because most of the usual indicators—such as prices of financial assets, inflation, and real economic activity—were giving off reasonably rosy, but false, signals. My wife was justifiably skeptical; could it not be that these indicators were right and that the deficit was just not a big deal? Anyhow, my wife argued, where did this CBO economist get his information if not from all the data that gave different answers? Probably he was just a slave to some outmoded economic theory that predicted effects that had not shown up. Moreover, she recalled that David Ricardo had developed a theory that said that budget deficits were roughly equivalent to taxation, and she thought that this theory conformed pretty well with the evidence that the CBO economist said we should ignore.

Naturally, I agreed with my wife, and said that the frequent expression of crisis was especially surprising because the ratio of privately held U.S. public debt to gross national product (GNP) has not been growing since 1987. Figure 6-1, which plots the data from 1790 to 1989, shows that the ratio fell from 0.39 at the end of 1987 to 0.38 at the end of 1989. As a related matter, Figure 6-2 shows that the ratio of the real budget deficit (measured here as the change in privately held real public debt) to real GNP declined from over 4 percent in 1983–85 to about 1 percent in 1989. I told my wife that, despite the virtual elimination of the budget deficit in 1988–89 and the absence of evidence that the deficits of prior years had any adverse consequences, it was hard to convince people that the U.S. budget deficit was not a major problem. But I promised to be convincing in this chapter.

THE STANDARD THEORY OF BUDGET DEFICITS

I will start with the standard theoretical model of budget deficits. Suppose that the government cuts current taxes and runs a budget deficit. The

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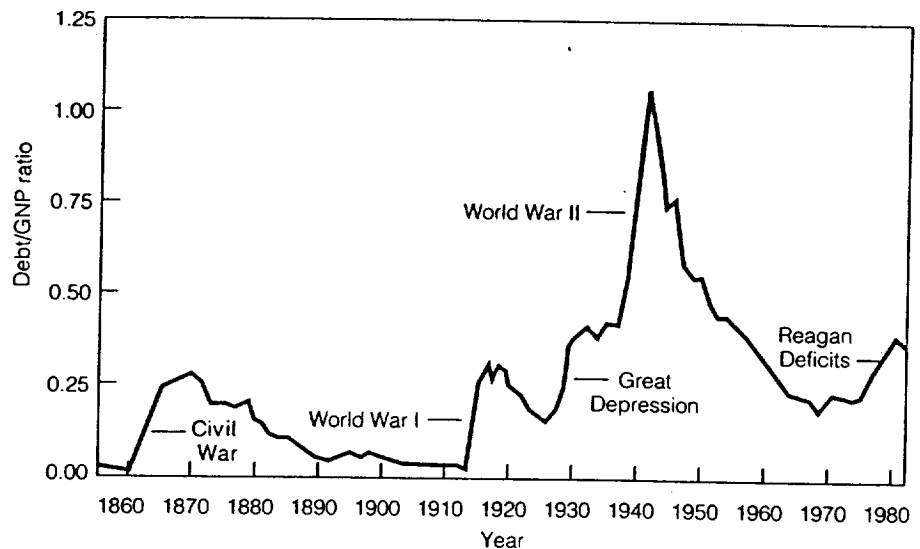


FIGURE 6-1 Ratio of Privately Held U.S. Public Debt to GNP

higher deficit implies, by definition, an equal decline in public saving. The standard analysis assumes that households respond to the increase in current disposable income, which equals the amount of the tax cut, partly with higher desired private saving and partly with higher consumer demand. Because desired private saving rises by only a fraction of the budget deficit, desired national saving (the sum of public and private saving) declines.

In a closed economy, accounting identities imply that national saving must end up equal to domestic investment. Therefore, the decline in desired national saving means that the real interest rate has to rise. (With the fall in desired national saving, there is an insufficient supply of funds to provide for the unchanged quantity of domestic investment demand.) The higher real interest rate restores an equilibrium by reducing investment demand and raising desired private saving. In particular, the new equilibrium features a smaller quantity of domestic investment. This "crowding out" of investment in the short run corresponds in the long run to a smaller stock of domestic capital. Thereby, in the language of Franco Modigliani (1961), the accumulation of public debt due to a budget deficit is a burden in that it leads to a smaller stock of productive capital for future generations. Similar reasoning applies to pay-as-you-go social security programs, as stressed by Martin Feldstein (1974). An increase in the scale of these programs raises aggregate demand and thereby leads to a higher real interest rate, a reduced flow of investment in the short run, and a smaller stock of capital in the long run.

The standard theory, as sketched above, implies a close association among budget deficits, real interest rates, and levels of investment. As I will argue later, these predictions do not accord well with evidence from the

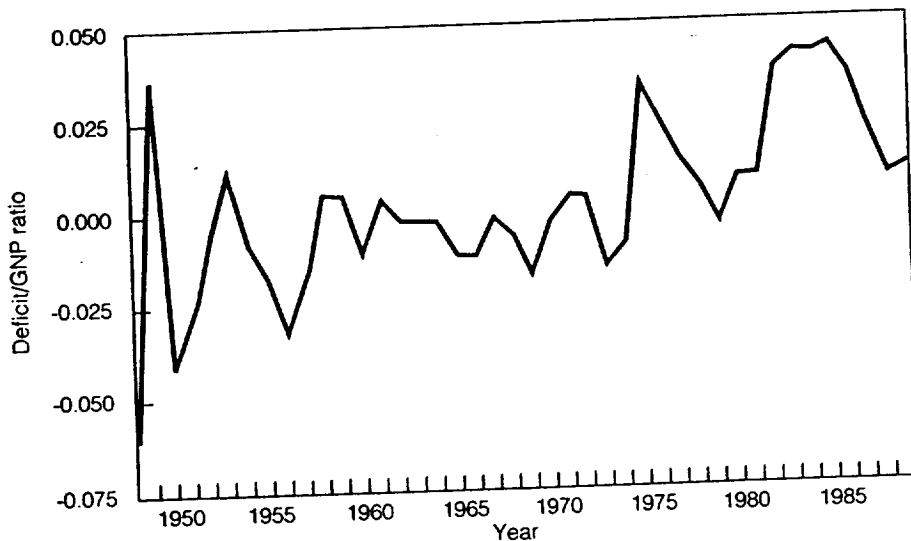


FIGURE 6-2 *Ratio of U.S. Real Budget Deficit to Real GNP*

United States or other industrialized countries. Because of this empirical failure and because of the increasing integration of the world economy, many economists have abandoned the framework of a closed economy when thinking about the effects of budget deficits.

In a setting of open economies, the standard analysis of budget deficits must be modified to allow for borrowing and lending across countries. A country's national saving now finances the total of domestic and net foreign investment. Net foreign investment equals the investments that the country pays for abroad less the amounts that foreigners pay for in this country. Hence, net foreign investment equals the current-account balance, which is the addition to this country's net claims on the rest of the world.

In an international economy with perfect markets for goods and credit, each country faces the same "world real interest rate," which is determined by the world aggregates of investment demand and desired saving. Therefore, if a single country's contribution to these world aggregates is small, the country's budget deficits and social security programs have negligible effects on the real interest rate that the country faces.

Given the assumptions about consumer behavior that we made before, a decision to finance government spending by a budget deficit rather than current taxes still leads in an open economy to an excess of domestic investment demand over desired national saving. But, instead of raising the real interest rate, this excess of investment demand is accommodated by borrowing from abroad. That is, a budget deficit leads to a current-account deficit or, equivalently, to a decline in net foreign investment. Real interest rates rise only to the extent that the country is large enough to influence the world economy, or to the extent that the increase in the country's

national debt induces foreign lenders to demand higher real interest rates as a risk premium. (Because of past and prospective defaults, many Latin American countries would have to pay high real interest rates on their debt—if anyone would lend to them at all these days.)

The main new result for an open economy is the much weaker tendency for a single country's budget deficit to be associated with higher real interest rates or reduced domestic investment. On the other hand, if the whole world runs budget deficits (or expands the scale of social security programs), then real interest rates would rise on international capital markets and investment would be crowded out in each country. These effects for the world parallel those for a single closed economy, as discussed before.

THE RICARDIAN THEORY OF BUDGET DEFICITS

An alternative theory of budget deficits relates to the research of the nineteenth century British economist, David Ricardo (see Ricardo, 1951; Barro, 1989). (Despite some misinformed opinions and independently of whether he regarded the theory as empirically valid, Ricardo was the first to enunciate this view in a clear manner; see Gerald O'Driscoll, 1977.) The Ricardian analysis begins with the proposition that a deficit-financed cut in current taxes leads to higher future taxes that have the same present value as the initial tax cut. In particular, the total present value of taxes cannot change unless the government changes the present value of its expenditures.¹ (The working assumption here is that the path of expenditures is given; nothing in the Ricardian view rules out important effects from changes in current or prospective government spending.) The invariance of the total present value of taxes amounts to the economist's standard notion of the absence of a free lunch—government spending has to be paid for now or later, but not never.

The next step in the Ricardian argument is that consumer demand depends on the anticipated present value of taxes. That is, each person subtracts his or her share of this present value from the present value of income to determine a net wealth position, which then determines desired consumption. Recall that a budget deficit does not affect the present value of taxes. Therefore, a budget deficit also has no impact on aggregate consumer demand. Another way to express this result is that a decrease in public saving (implied by a larger budget deficit) leads to an exactly offsetting increase in desired private saving, and hence to no change in desired national saving.

Note that the constancy of desired national saving applies in the Ricardian analysis only if the budget deficit is not accompanied by a recession, which would alter the expected path of household income, or by a shift in the expected present value of government spending. Changes in anticipated income or government spending generally affect desired national saving;

that is, the response of desired private saving would no longer precisely offset the change in public saving. These caveats are important because budget deficits are, in practice, often associated with recessions or wartime expenditures. The Ricardian invariance of desired national saving applies only if the effects from recession and wartime spending are held constant.

Recall for a closed economy that desired national saving must be equated to domestic investment demand. The result that we just derived is that a budget deficit does not affect desired national saving. Therefore, the real interest rate does not have to change to maintain the equality between desired national saving and domestic investment demand, each of which has not changed. In other words, the Ricardian model implies that a budget deficit has no effect in a closed economy on the real interest rate or the quantity of investment. With investment unchanged, budget deficits also have no long-term implications for the capital stock; hence, there is no burden of the debt in the sense of Modigliani.

In an open economy, the current-account balance equals net foreign investment, which equals the excess of desired national saving over domestic investment demand. In the Ricardian model, a budget deficit does not affect desired national saving and therefore does not affect the current-account balance. That is, budget deficits do not lead to current-account deficits. There is no need to borrow from abroad because desired private saving from domestic residents rises enough to compensate for the decline in public saving.

To summarize, the Ricardian analysis implies that shifts between taxes and budget deficits do not matter for the real interest rate, the quantity of investment, or the current-account balance. These conclusions are sometimes referred to as the Ricardian Equivalence Theorem. That is, given the quantity of government spending, taxes and budget deficits have equivalent effects on the economy. Basically, the effects are equivalent because a higher current budget deficit (to finance a current tax cut) implies an increase by an equal amount in the present value of future taxes.

THEORETICAL OBJECTIONS TO THE RICARDIAN MODEL

I shall discuss four major theoretical criticisms that have been raised against the Ricardian approach. The first is that people do not live forever, and hence do not care about taxes that are levied after death. The second is that private capital markets are "imperfect," with the typical person's real discount rate exceeding the real interest rate paid by the government. The third is that future taxes and incomes are uncertain. The fourth is that the timing of taxes matters if taxes are not lump sum; specifically, if taxes apply to income, spending, wealth, and so on.

It turns out that each of the four types of criticisms may imply that budget deficits matter; that is, are nonneutral and hence not fully Ricardian.

Nevertheless, it is important to consider in each case first, whether the effects are likely to be quantitatively significant, and second, whether the particular point supports the standard model of budget deficits that was outlined before. There is an unfortunate tendency among macroeconomists to make an argument about why budget deficits are not fully neutral, and then use the standard approach, which usually is not supported by the argument.

Finite Lifetimes

I will, of course, accept the empirical proposition that people do not live forever. The question is the relevance of this fact for the Ricardian conclusions. The channel for overturning Ricardian equivalence is that, with finite lifetimes, people may consider only the future taxes that they expect to face before dying.

Suppose that a deficit-financed tax cut raises future taxes partly during the typical person's expected lifetime and partly afterwards. Then the present value of the first part must fall short of the initial tax cut because a balance occurs only if the second part is also included. Hence the net wealth of people currently alive rises. Households respond to the rise in wealth by raising consumption demand; that is, only a fraction of the extra disposable income goes into desired private saving. The increase in consumer demand implies an increase in aggregate demand, which was the starting point for the standard model that was sketched before. Therefore, the other conclusions from the standard analysis apply: A budget deficit leads in a closed economy to a higher real interest rate and lower investment, and in an open economy to a current-account deficit.

This analysis of the effects of finite lifetimes is valid only if the typical person feels wealthier when the government shifts a tax burden to his or her descendants. The reasoning fails if the typical person is already giving or planning to give to his or her children out of altruism, a situation that appears to be prevalent. In this case, people react to the government's imposed intergenerational transfers, which are implied by a budget deficit or social security, with a compensating increase in voluntary transfers (see Barro, 1974). For example, parents adjust their bequests or the amounts given to children while the parents are still living. Alternatively, if children provide support to aged parents, the amounts given respond inversely to budget deficits or social security.

The central idea is that a network of intergenerational transfers makes the typical individual part of an extended family that goes on indefinitely. In this setting, households consider the entire stream of expected future taxes, as assumed in the Ricardian analysis. In other words, the Ricardian results, which seemed to depend on people living forever, can remain valid in a model with finite lifetimes.

It is worth noting that the results do not require large intergenerational transfers; what is necessary is that transfers based on altruism be operative

at the margin for most people. Also, the transfers do not have to show up as bequests at death. Other forms of intergenerational transfers, such as *inter vivos* gifts to children, support of children's education, and child support of aged parents, work in a similar manner. Therefore, the Ricardian results can hold even if many persons leave little in the way of formal bequests.

Imperfect Loan Markets

Many economists argue that the imperfection of private credit markets is central to analyses of budget deficits. The nature of credit markets arises in the computation of the present value of expected future taxes. The assumption in the Ricardian analysis is that the discount rate used to determine the present value is the same as the real interest rate that the government pays on its debts. More realistically, many borrowers have to pay interest rates that substantially exceed the government's rate. These high interest rates reflect the costs of evaluating, processing, and collecting loans.

The effects of credit-market imperfections can be studied satisfactorily by returning to the setting of a closed economy in which households effectively have infinite horizons. Suppose that some businesses and households, denoted as group I, have low interest rates—good access to credit markets—and are therefore willing to hold government bonds. A second group, denoted as group II, have high interest rates for borrowing and therefore do not want to hold government bonds.

Consider now the effect of a deficit-financed tax cut. We know from previous discussions that the present value of future taxes (discounted by the government's interest rate) goes up by as much as the tax cut. Assume that today's tax cut is divided evenly between group I and group II, and that the higher future taxes are also divided evenly between the two groups. Then the members of group I willingly hold 50 percent of the extra government bonds, as in previous analyses. The members of group II, however, do not want to hold government bonds; they use their tax cut instead to raise demand for consumption and investment. In the aggregate, therefore, desired national saving decreases (because private saving rises by less than the decline in public saving) and investment demand increases. Consequently, the real interest rate has to rise to restore equality between desired national saving and investment demand, or equivalently, the government has to pay a more attractive interest rate to induce the private sector to absorb its extra debt.

Because the members of group II are unwilling to hold government bonds, the interest rate must rise by enough to induce members of group I to hold the additional bonds. If the interest rate rises a lot, then some members of group II would start to hold government bonds; that is, some members of group II would become members of group I. But, in any event, the key result is that group I ends up holding more than 50 percent (and perhaps as much as 100 percent) of the additional public debt, whereas

group II ends up holding less than 50 percent (and perhaps as little as 0 percent) of the debt.

Because group I and group II end up holding unequal shares of the new government bonds, the budget deficit turns out to improve the allocation of credit in the economy. In particular, by holding less than their share of the new bonds, the individuals and businesses with poor access to credit markets (group II) effectively receive loans from the individuals and businesses with good access to credit (group I). The government acts like a financial intermediary between the two groups; it collects taxes from members of group II and distributes the proceeds as interest payments to members of group I. The process works because the government guarantees repayment of loans through its tax collections and debt payments. Thus, loans between members of groups I and II effectively take place even though such loans were not viable privately because of the high costs of evaluation, processing, and collection.

The government may be relatively efficient at collecting funds from people with poor collateral (members of group II) because of compulsory taxation and police powers. Offsetting this force is the tendency for private organizations to be more efficient than government because choices in the public sector involve greater problems of incentives and information. If the government really were more efficient at the credit process, one wonders why it has such difficulty in collecting on loans from students!

If the government is more efficient than the private market in the loan process, then an expansion of public debt amounts to an improvement in financial intermediation. The main result is a better allocation of credit, in the sense that funds flow toward the higher-return investments or more urgent consumption expenditures for members of group II. (Because of high interest rates on loans, the members of group II were previously unable to exploit fully their opportunities for high-return investment or urgent consumption.) The effect on aggregate investment is unclear; the results depend on whether members of group II are more likely to spend their tax cut on investment or consumption and on whether members of group I are more likely to cut back on investment or consumption (in response to the rise in the interest rate). In any event, although budget deficits are nonneutral and hence non-Ricardian, the results do not resemble those from the standard model of budget deficits. In particular, budget deficits are basically a good idea in this model.

Another possibility is that the government is no more efficient than the private market in the loan process; that is, the provision of credit involves "transaction costs" and is therefore "imperfect" whether carried out publicly or privately. In this case, a budget deficit turns out not to affect the distribution of spending across groups or the aggregate levels of investment and consumption. The reason is that the intermediation implied by the government's deficit is now no different from the intermediation that can occur privately. Thus, in this case, the Ricardian equivalence result—that budget deficits do not matter—holds even though credit markets are imperfect.

Uncertainty about Future Taxes and Incomes

Uncertainty about an individual's future taxes does not imply that the expected level of these taxes counts for less than otherwise. In fact, with the introduction of uncertainty, it is possible to get an increase in desired national saving in response to a budget deficit. This possibility arises because people want to protect themselves against the chance of surprisingly high future taxes. The main counter force is that, with income taxes, the government shares the risks of income uncertainty with individuals. People pay more in taxes if they are lucky to have unexpectedly high income and vice versa. A budget deficit raises the extent of this sharing in the future (when taxes are higher), and may therefore motivate a reduction in current desired saving. Thus, the overall implications of uncertainty for the effects of budget deficits are ambiguous.

The Timing of Taxes

Budget deficits affect the timing of taxes; specifically, a larger deficit means less taxes today and more in the future. Unless the taxes are lump sum, household behavior would depend on when the taxes were levied. For example, with an income tax, a change in timing alters people's incentives to work and produce in various periods. It follows that a budget deficit is nonneutral; that is, the results are non-Ricardian. The conclusions tend, however, also to depart from the standard model of budget deficits.

Because a budget deficit lowers today's income tax rate relative to future rates, people tend to raise today's income (by increasing current labor supply and production) relative to future income. On the other hand, because the tax rates do not apply to consumption, households have no incentive to change the time pattern of consumer demand. It follows that desired national saving would rise; the result opposite to that in the standard analysis. The standard conclusion of a decline in desired national saving tends to hold, however, if the government uses the budget deficit to rearrange the timing of consumption taxes (such as sales taxes in the United States or value-added taxes in many other countries).

To go further, one can derive the path of tax rates and hence budget deficits that is optimal from the standpoint of an overall package of public finance. That is, in addition to choosing the types of taxes—such as levies on income, consumption, and wealth—the government would also choose when to collect each tax. The budget deficit would emerge as a by-product of this "optimal-tax" calculation.

One conclusion from this optimal-tax analysis is that budget deficits can be used advantageously to smooth tax rates over time, despite fluctuations in government expenditures and the tax base (see A.C. Pigou, 1928, Ch. 6; Barro, 1979). For example, budget deficits would be large during wars and recessions to avoid abnormally high tax rates during these emergencies. Furthermore, because the optimal-tax policy is framed in real terms, the

nominal debt would rise along with expected increases in the price level. This behavior corresponds to the common practice of making inflation adjustments to the reported figures on budget deficits. For example, in Figure 6-2, these adjustments were made by computing the real deficit as the change over the year in the real quantity of outstanding debt. Pure inflation, which leads to corresponding growth of the nominal debt, would not affect this measure of the real budget deficit.

The tax-smoothing view of budget deficits accounts for much of the history of the public debt in the United States and other countries. In the long-term U.S. data, most of the movements in the ratio of the public debt to GNP, as shown in Figure 6-1, can be explained by war and recession. For example, the debt-GNP ratio rose during the Civil War from 0.01 in 1860 to 0.24 in 1865, during World War I from 0.02 in 1916 to 0.31 in 1919, and during World War II from 0.42 in 1941 to 1.07 in 1945.² With respect to economic contraction, the debt-GNP ratio rose from 0.14 in 1929 to 0.38 in 1933 (the period of the Great Depression), from 0.18 in 1974 to 0.23 in 1976 (with the 1974-75 recession), and from 0.22 in 1979 to 0.30 in 1983 (with the recessions from 1980 to 1983).

Aside from periods of war or major economic contraction, the typical behavior shown in Figure 6-1 is a declining ratio of the public debt to GNP. The major departure from this long-established pattern shows up during the Reagan administration, especially from 1984 to 1987. The debt-GNP ratio rose from 0.30 in 1983 to 0.39 in 1987 (before declining to 0.38 in 1989), despite the absence of war or recession. This behavior of the debt-GNP ratio corresponds to high ratios of real budget deficits to real GNP, which averaged 3.4 percent from 1984 to 1987, before declining to an average of less than 0.8 percent for 1988-89 (see Figure 6-2).

I should note that the measure of public debt used in these calculations is the privately held total; amounts held by the Federal Reserve and government trust funds, including social security, are netted out.³ In particular, this definition effectively consolidates expenditures and receipts of the social security system with the rest of the federal government. In the past, economists agreed that this consolidation was a good idea; after all, social security expenditures (a type of transfer payment) are a form of federal spending and social security receipts amount to a federal payroll tax.

Recently—that is, since the social security system began to run a surplus—some people have argued that the federal government's deficit or surplus should be calculated independently of social security. One possible reason to think about social security separately is that, because of demographic trends, the ratio of social security benefit payments to GNP is expected to grow over time. If other components of federal spending were expected to maintain a constant ratio to GNP, then the tax-smoothing viewpoint would argue for a current budget surplus. That is, tax rates should be raised currently to match the higher anticipated future ratio of total government spending, including social security transfers, to GNP. Of course, this projection about social security expenditures may be incorrect.

In particular, forecasts for social security depend on whether changes occur in benefit formulas, on whether immigration upsets the demographic projections, and so on.

The general point, which is not special to social security, is that projections about future government spending would influence today's optimal fiscal policy. If the ratio to GNP of some component of spending—such as national defense—is projected to rise or fall over time, and if the rest of spending is expected to stay constant in relation to GNP, then tax smoothing calls, respectively, for a current budget surplus or deficit. For example, if we (or Ronald Reagan) somehow knew in the mid-1980s that future changes in Eastern Europe would allow for a peace dividend, then the appropriate response would have been to run a budget deficit. This deficit would be reasonable if we expected the decline in defense spending to result in a decrease in the ratio of total government spending to GNP.

In any event, the implications for desirable deficit policy involve forecasts of the overall level of federal spending, including social security, as a ratio to GNP. Thus, it would surely be inappropriate to follow the suggestion of omitting social security in a consideration of federal spending, taxes, and budget deficits.

I have seen three possible explanations for the excessive real budget deficits of 1984–87. First, they may simply be mistakes.⁴ The cost of these mistakes involves the future tax rates that are higher than otherwise because of the financing required for the higher stock of accumulated public debt. The alternative would have been a smoother pattern in which tax rates were above the actual values at the beginning (that is, in the mid-1980s) and below the actual values later on.

Second, people may believe that the "Reagan Revolution" portends a declining share of federal spending in GNP. In that case, current spending would be temporarily high in relation to GNP. Then, as in wartime, it would be sensible to run a budget deficit instead of maintaining temporarily high tax rates. I thought until recently that this argument was implausible, but—as suggested before—the possibility of a peace dividend may make it correct after all. (Could Reagan have anticipated this peace dividend?)

The third argument is that the buildup of federal debt is a device to make it harder for subsequent administrations (maybe even Democrats) to raise spending on other programs. If a president who favors a smaller federal government, such as Ronald Reagan, leaves office with a large stock of accumulated public debt, then the interest payments on this debt would absorb a large amount of future tax revenues. If the next president and Congress want to fund some new or expanded social programs, such as day care, environmental protection, or education, then tax revenues would have to be raised still further. The difficulty of these tax increases makes it less likely that the social programs will be implemented.

Although this political argument has some appeal, the puzzle is why the device was first discovered in 1984. That is, previous periods do not seem to reveal the same kind of strategic political behavior. At least, one does not

have to bring in these political arguments to explain most of the history of the U.S. public debt.

EMPIRICAL EVIDENCE ON THE ECONOMIC EFFECTS OF BUDGET DEFICITS

It is easy on theoretical grounds to raise points that invalidate strict Ricardian equivalence between budget deficits and taxes. Nevertheless, it may still be that the Ricardian view provides a useful framework for assessing the main effects of fiscal policy. Furthermore, it is unclear that the standard approach offers a more accurate guide. For these reasons, it is especially important to examine empirical evidence.

Interest Rates

The Ricardian model predicts that real interest rates will not respond to an increase in the budget deficit or the stock of public debt, whereas the standard view predicts that real interest rates will rise (at least in the context of a closed economy). Many economists have tested these propositions empirically for the United States and other countries (see, for example, Plosser [1982, 1987]; Evans [1987a, 1987b]; U.S. Treasury Department [1984]; Barro and Martin [1990]). Typical results show little relation of interest rates to budget deficits or the stock of public debt.

Although it is only a minor part of the overall statistical picture, the U.S. behavior since 1981 highlights the results about interest rates. Despite high and typically rising real budget deficits from 1981 to 1986, nominal interest rates fell dramatically until recently. Moreover, short-term expected real interest rates fell from 1984 to 1986, and rose in 1989 when the real budget deficit was relatively small.

Overall, the empirical evidence on interest rates supports the Ricardian view. Given these findings, it is remarkable that most people remain confident that budget deficits raise interest rates. Such confidence derives more from repetition of the story than from economic theory or empirical results.

Investment and Saving

The Ricardian model predicts that domestic investment and national saving will not react to an increase in the budget deficit or the stock of public debt. The standard model predicts that domestic investment and national saving will decline in a closed economy, and that national saving will decline in an open economy.

The evidence about the effects of budget deficits on investment and saving is less clear than it is for interest rates. Unfortunately, statistical issues and questions about how to measure investment and saving cause

problems in getting definitive answers. For example, in the U.S. data since the mid-1980s, the ratio of a broad concept of real gross investment spending (including purchases of consumer durables) to real GNP is at a post-World War II high, whereas the ratio of the national accounts' concept of net national saving to GNP is low. Thus, the picture depends on issues such as the accuracy of the reported figures on depreciation, the inclusion of purchases of consumer durables as a component of investment and saving, and the distinction between real investment (relative to real GNP) versus nominal investment (relative to nominal GNP).

Because of these problems, I put a lot of weight on some special situations that look more like natural experiments. One such study, carried out by Chris Carroll and Lawrence Summers (1987), compares saving rates in Canada and the United States. They note that the private saving rates in the two countries were similar until the early 1970s, but have since diverged; for 1983-85, the Canadian rate was higher by about six percentage points. After holding fixed some macroeconomic variables and aspects of the tax systems that influence saving, the authors isolate a roughly one-to-one, positive effect of government budget deficits on private saving. That is, the rise in the private saving rate in Canada, relative to that in the United States, reflected the greater increase in the Canadian budget deficit as a ratio to GNP. Thus, as implied by the Ricardian view, the relative values of the national saving rates in the two countries appeared to be invariant with the relative values of the budget deficits.

Recent fiscal policy in Israel comes close to providing a natural experiment for studying the interplay between budget deficits and saving. In 1983, the gross national saving rate of 13 percent consisted of a private saving rate of 17 percent and a public saving rate of -4 percent. In 1984, a dramatic rise in the budget deficit led to a public saving rate of -11 percent. Interestingly, the private saving rate rose to 26 percent, so that the national saving rate changed little; actually rising from 13 to 15 percent. Then the Israeli stabilization program in 1985 eliminated the budget deficit, so that the public saving rate rose from -11 percent in 1984 to values close to 0 in 1985-87. Remarkably, the private saving rate decreased dramatically at the same time, going from 26 percent in 1984 to 19 percent in 1985 and 14 percent in 1986-87. Therefore, national saving rates were relatively stable, going from 15 percent in 1984 to 18 percent in 1985, 14 percent in 1986, and 12 percent in 1987. The main point is that this extreme experiment reveals the roughly one-to-one offset between public and private saving that the Ricardian model predicts.

Finally, Barro and Xavier Sala i Martin (1990) studied the determination of gross investment for 10 major industrialized countries. The overall production of these countries is large enough (about two-thirds of the gross domestic product for the world's market economies) that we can think of the 10-country aggregate of investment as determined in a closed economy that approximates the entire world. The empirical results pinpointed a number of variables that mattered for aggregate investment, including

shifts in stock market prices (which reflect changes in the perceived profitability of investment) and movements in oil prices. However, fiscal variables—measured as 10-country aggregates of real budget deficits and stock of public debt—were insignificantly related to investment (or to real interest rates).

Current-Account Deficits

The Ricardian approach predicts that the current-account deficit would not respond to an increase in the budget deficit, whereas the standard analysis predicts that the current-account deficit would increase. Thus, an advocate of the standard model would emphasize the coincidence of large current-account and budget deficits in the United States since 1983. A careful study of the U.S. time series is, however, less supportive of the standard view that budget deficits lead to current-account deficits. For example, U.S. budget and current-account deficits were virtually uncorrelated from 1948 to 1982. Moreover, the details of the timing after 1982 do not reveal a positive linkage from budget to current-account deficits.

One clue to the recent behavior of the U.S. current account comes from the performance of U.S. investment. As mentioned before, a broad concept of U.S. investment spending (including consumer durables) has been at a post-World War II high in relation to GNP since the mid-1980s. The standard theory of the current account, which stresses high U.S. budget deficits, would predict low, or at best average, U.S. domestic investment. An alternative view is that changes in regulatory and tax policies in the 1980s made investments in the United States more attractive relative to investments in other countries. Unlike the standard view, this approach can explain a high U.S. current-account deficit along with robust investment in the United States.

In a recent study, Paul Evans (1988) carried out an empirical investigation of the relation between budget and current-account deficits in five major industrialized countries (Canada, France, Germany, the United Kingdom, and the United States). His overall finding is that the current account is largely independent of budget deficits. Hence, these results are consistent with the Ricardian position. A priority item on the list of desirable research is more international evidence of this kind.

CONCLUDING OBSERVATIONS

The Ricardian approach to budget deficits amounts to the statement that the government's fiscal impact is summarized by the present value of its expenditures. Given this present value, rearrangements of the timing of taxes—as implied by budget deficits—have no first-order effect on the economy. Second-order effects arise for various reasons, which include the distorting effects of taxes, the uncertainties about individual incomes and

tax obligations, the imperfections of credit markets, and the finiteness of life. To say that these effects are second order is not to say that they are uninteresting; in fact, the analysis of different kinds of taxes in the theory of public finance is second order in the same sense. Careful analysis of these second-order effects tends, however, to deliver predictions about budget deficits that usually depart from those of standard macroeconomic models.

I have argued that empirical findings on interest rates, investment and saving, and the current-account balance tend mainly to support the Ricardian viewpoint. However, this empirical analysis involves substantial problems about data and statistical technique, and the results are sometimes inconclusive. It would be useful to assemble additional evidence, especially in an international context.

Although the majority of economists still leans toward standard macroeconomic models of fiscal policy, it is remarkable how respectable the Ricardian approach has become in the last decade. Most macroeconomists now feel obligated to state the Ricardian position, even if they then argue that it is either theoretically or empirically wrong. I predict that this trend will continue and that the Ricardian approach will become the benchmark model for assessing fiscal policy.

Finally, given my view that U.S. budget deficits are not very important, I should comment about why I think the debate about these deficits is so intense and enduring. The likely reason is that the real controversy is about the size of the federal government, rather than the size of the federal deficit. That is, the key question is not whether the deficit will be reduced (as it was from 1987 to 1989), but whether the reduction will involve increases in taxes or cuts in expenditures. Those who argue that taxes must rise (and are dutifully applauded by most of the media as being realistic and courageous) are really saying that they want a larger federal government. Those who rule out tax increases are seeking to maintain or decrease the scope of the government. At least for people who like smaller government, it is these latter politicians who are candidates for heroism. In any event, unlike the budget deficit, the size of government is an important question, which does deserve a lot of attention. Perhaps it would be better if the debate were couched in these terms, rather than in terms of who is or is not realistic or courageous, and who is or is not a fiscal conservative.

NOTES

1. For this proposition to be exact, we have to include the revenue from money creation as a form of tax (the "inflation tax").
2. For a discussion of the behavior of the British public debt during wartime from 1700 to 1918, see Barro (1987).
3. The figures apply, however, to the federal government and not to total government. In particular, state and local governments are combined with the private sector. It would be preferable to look at consolidated government, but the data from the state and local sector are not as good, especially in earlier years.

4. In this case, they also constitute good scientific experiments, because budget deficits run for no good reason make it easier to figure out the consequences of these deficits. Thus, economists who dislike Reagan's fiscal policies on other grounds should at least applaud this contribution to scientific inquiry.

Citations at end of Book