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The Ricardian Approach to Budget Deficits

Robert J. Barro

In recent years there has been a lot of discussion about U.S. budget deficits. Many economists and other observers have viewed these deficits as harmful to the U.S. and world economies. The supposed harmful effects include high real interest rates, low saving, low rates of economic growth, large current-account deficits in the United States and other countries with large budget deficits, and either a high or low dollar (depending apparently on the time period). This crisis scenario has been hard to maintain along with the robust performance of the U.S. economy since late 1982. This performance features high average growth rates of real GNP, declining unemployment, much lower inflation, a sharp decrease in nominal interest rates and some decline in expected real interest rates, high values of real investment expenditures, and (until October 1987) a dramatic boom in the stock market.

Persistent budget deficits have increased economists' interest in theories and evidence about fiscal policy. At the same time, the conflict between standard predictions and actual outcomes in the U.S. economy has, I think, increased economists' willingness to consider approaches that depart from the standard paradigm. In this paper I will focus on the alternative theory that is associated with the name of David Ricardo.

The Standard Model of Budget Deficits

Before developing the Ricardian approach, I will sketch the standard model. The starting point is the assumption that the substitution of a budget deficit for current

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taxation leads to an expansion of aggregate consumer demand. In other words, desired private saving rises by less than the tax cut, so that desired national saving declines. It follows for a closed economy that the expected real interest rate would have to rise to restore equality between desired national saving and investment demand. The higher real interest rate crowds out investment, which shows up in the long run as a smaller stock of productive capital. Therefore, in the language of Franco Modigliani (1961), the public debt is an intergenerational burden in that it leads to a smaller stock of capital for future generations. Similar reasoning applies to pay-as-you-go social security programs, as has been stressed by Martin Feldstein (1974). An increase in the scope of these programs raises the aggregate demand for goods, and thereby leads to a higher real interest rate and a smaller stock of productive capital.

In an open economy, a small country's budget deficits or social security programs would have negligible effects on the real interest rate in international capital markets. Therefore, in the standard analysis, the home country's decision to substitute a budget deficit for current taxes leads mainly to increased borrowing from abroad, rather than to a higher real interest rate. That is, budget deficits lead to current-account deficits. Expected real interest rates rise for the home country only if it is large enough to influence world markets, or if the increased national debt induces foreign lenders to demand higher expected returns on this country's obligations. In any event, there is a weaker tendency for a country's budget deficits to crowd out its domestic investment in the short run and its stock of capital in the long run. However, the current-account deficits show up in the long run as a lower stock of national wealth—and correspondingly higher claims by foreigners.

If the whole world runs budget deficits or expands the scale of its social insurance programs, real interest rates rise on international capital markets, and crowding-out of investment occurs in each country. Correspondingly, the world's stock of capital is lower in the long run. These effects for the world parallel those for a single closed economy, as discussed before.

The Ricardian Alternative

The Ricardian modification to the standard analysis begins with the observation that, for a given path of government spending, a deficit-financed cut in current taxes leads to higher future taxes that have the same present value as the initial cut. This result follows from the government's budget constraint, which equates total expenditures for each period (including interest payments) to revenues from taxation or other sources and the net issue of interest-bearing public debt. Abstracting from chain-letter cases where the public debt can grow forever at the rate of interest or higher, the present value of taxes (and other revenues) cannot change unless the government changes the present value of its expenditures. This point amounts to economists' standard notion of the absence of a free lunch—government spending must be paid for now or later, with the total present value of receipts fixed by the total present value of spending. Hence, holding fixed the path of government expenditures and

non-tax revenues, a cut in today's taxes must be matched by a corresponding increase in the present value of future taxes.¹

Suppose now that households' demands for goods depend on the expected present value of taxes—that is, each household subtracts its share of this present value from the expected present value of income to determine a net wealth position. Then fiscal policy would affect aggregate consumer demand only if it altered the expected present value of taxes. But the preceding argument was that the present value of taxes would not change as long as the present value of spending did not change. Therefore, the substitution of a budget deficit for current taxes (or any other rearrangement of the timing of taxes) has no impact on the aggregate demand for goods. In this sense, budget deficits and taxation have equivalent effects on the economy—hence the term, “Ricardian equivalence theorem.”² To put the equivalence result another way, a decrease in the government's saving (that is, a current budget deficit) leads to an offsetting increase in desired private saving, and hence to no change in desired national saving.

Since desired national saving does not change, the real interest rate does not have to rise in a closed economy to maintain balance between desired national saving and investment demand. Hence, there is no effect on investment, and no burden of the public debt or social security in the sense of Modigliani (1961) and Feldstein (1974). In a setting of an open economy there would also be no effect on the current-account balance because desired private saving rises by enough to avoid having to borrow from abroad. Therefore, budget deficits would not cause current-account deficits.

Theoretical Objections to Ricardian Equivalence

I shall discuss five major theoretical objections that have been raised against the Ricardian conclusions. The first is that people do not live forever, and hence do not care about taxes that are levied after their death. The second is that private capital

¹The calculations use the government's interest rate in each period to calculate present values, and assume perfect foresight with respect to future government expenditures and taxes. For further discussion see Ben McCallum (1984) and Robert Barro (1989).

²The term, Ricardian equivalence theorem, was introduced to macroeconomists by James Buchanan (1976). After Gerald O'Driscoll (1977) documented Ricardo's reservations about this result, some economists have referred to the equivalence finding as being non-Ricardian. But, as far as I have been able to discover, David Ricardo (1951) was the first to articulate this theory. Therefore, the attribution of the equivalence theorem to Ricardo is appropriate even if he had doubts about some of the theorem's assumptions. As to whether the presence of this idea in Ricardo's writings is important for scientific progress, I would refer to Nathan Rosenberg's (1976, p. 79) general views on innovations in the social sciences: “... what often happens in economics is that, as concern mounts over a particular problem... an increasing number of professionals commit their time and energies to it. We then eventually realize that there were all sorts of treatments of the subject in the earlier literature. ... We then proceed to read much of our more sophisticated present-day understanding back into the work of earlier writers whose analysis was inevitably more fragmentary and incomplete than the later achievement. It was this retrospective view which doubtless inspired Whitehead to say somewhere that everything of importance has been said before—but by someone who did not discover it.” (This last point relates to “Stigler's Law,” which states that nothing is named after the person who discovered it.)

markets are “imperfect,” with the typical person’s real discount rate exceeding that of the government. The third is that future taxes and incomes are uncertain. The fourth is that taxes are not lump sum, since they depend typically on income, spending, wealth, and so on. The fifth is that the Ricardian result hinges on full employment. I assume throughout that the path of government spending is given. The Ricardian analysis applies to shifts in budget deficits and taxes for a given pattern of government expenditures; in particular, the approach is consistent with real effects from changes in the level or timing of government purchases and public services.

In many cases it turns out that budget deficits matter, and are in that sense non-Ricardian. It is important, however, to consider not only whether the Ricardian view remains intact, but also what alternative conclusions emerge. Many economists raise points that invalidate strict Ricardian equivalence, and then simply assume that the points support a specific alternative; usually the standard view that a budget deficit lowers desired national saving and thereby drives up real interest rates or leads to a current-account deficit. Many criticisms of the Ricardian position are also inconsistent with this standard view.

Finite Horizons and Related Issues

The idea of finite horizons, motivated by the finiteness of life, is central to life-cycle models—see, for example, Franco Modigliani and Richard Brumberg (1954) and Albert Ando and Franco Modigliani (1963). In these models individuals capitalize only the taxes that they expect to face before dying. Consider a deficit-financed tax cut, and assume that the higher future taxes occur partly during the typical person’s expected lifetime and partly thereafter. Then the present value of the first portion must fall short of the initial tax cut, since a full balance results only if the second portion is included. Hence the net wealth of persons currently alive rises, and households react by increasing consumption demand. Thus, as in the standard approach sketched above, desired private saving does not rise by enough to offset fully the decline in government saving.

A finite horizon seems to generate the standard result that a budget deficit reduces desired national saving. The argument works, however, only if the typical person feels better off when the government shifts a tax burden to his or her descendants. The argument fails if the typical person is already giving to his or her children out of altruism. In this case people react to the government’s imposed intergenerational transfers, which are implied by budget deficits or social security, with a compensating increase in voluntary transfers (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 can respond (negatively) to budget deficits or social security.

The main idea is that a network of intergenerational transfers makes the typical person a part of an extended family that goes on indefinitely. In this setting, households capitalize the entire array of expected future taxes, and thereby plan effectively with an infinite horizon. In other words, the Ricardian results, which

seemed to depend on infinite horizons, can remain valid in a model with finite lifetimes.

Two important points should be stressed. First, intergenerational transfers do not have to be “large;” what is necessary is that transfers based on altruism be operative at the margin for most people.³ Specifically, most people must be away from the corner solution of zero transfers, where they would, if permitted, opt for negative payments to their children. (The results also go through, however, if children typically support their aged parents.) Second, 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 so on, can work in a similar manner. Therefore, the Ricardian results can hold even if many persons leave little in the way of formal bequests.

One objection to Ricardian equivalence is that some persons, such as those without children, are not connected to future generations (see James Tobin and Willem Buiter, 1980, pp. 86ff.). Persons in this situation tend to be made wealthier when the government substitutes a budget deficit for taxes. At least this conclusion obtains to the extent that the interest and principal payments on the extra public debt are not financed by higher taxes during the remaining lifetimes of people currently alive. However, the quantitative effects on consumption tend to be small. For example, if the typical person has 30 years of remaining life and consumes at a constant rate, a one-time budget deficit of \$100 per person would increase each person’s real consumption demand by \$1.50 per year if the annual real interest rate is 5 percent, and by \$2.10 per year if the real interest rate is 3 percent.⁴

The aggregate effect from the existence of childless persons is even smaller because people with more than the average number of descendants experience a decrease in wealth when taxes are replaced by budget deficits. (In effect, although some people have no children, all children must have parents.) In a world of different family sizes, the presumption for a net effect of budget deficits on aggregate consumer demand depends on different propensities to consume out of wealth for people with and without children. Since the propensity for those without children tends to be larger (because of the shorter horizon), a positive net effect on aggregate consumer demand would be predicted. However, the quantitative effect is likely to be trivial. Making the same assumptions as in the previous example, a budget deficit of \$100 per capita would raise real consumption demand per capita by 30 cents per year if the real interest rate is 5 percent, and by 90 cents if the real interest rate is 3 percent.

A variety of evidence supports the proposition that intergenerational transfers—defined broadly to go beyond formal bequests—are operative for most people.

³Philippe Weil (1987) and Miles Kimball (1987) analyze conditions that ensure an interior solution for intergenerational transfers. Douglas Bernheim and Kyle Bagwell (1988) argue that difficulties arise if altruistic transfers are pervasive. See Barro (1989) for a discussion of their analysis.

⁴The assumption is the real debt remains permanently higher by the amount of the initial deficit. For some related calculations, see Merton Miller and Charles Upton (1974, Chapter 8) and James Poterba and Lawrence Summers (1987, Section I).

Michael Darby (1979, Ch. 3) and Laurence Kotlikoff and Lawrence Summers (1981) calculate that the accumulation of households' assets in the United States for the purpose of intergenerational transfers is far more important than that associated with the life cycle. This observation suggests that most people give or receive intergenerational transfers; a conclusion that supports the Ricardian position. Franco Modigliani (1988) contests this conclusion, but Laurence Kotlikoff (1988) shows that Modigliani's findings derive from an extremely narrow view of intergenerational transfers. Modigliani focuses on bequests at death, and he also does not treat interest earnings on prior bequests as income attributable to intergenerational transfers.

Some authors accept the idea that intergenerational transfers are important, but argue that the motivation for the transfers matters for the results. Douglas Bernheim, Andrei Shleifer and Lawrence Summers (1985) consider the possibility that bequests, instead of being driven by altruism, are a strategic device whereby parents induce their children to behave properly. Some imaginative evidence is presented (involving how often children visit and communicate with their parents) to document the importance of strategic bequests. In this strategic model, if the government redistributes income from young to old (by running a deficit or raising social security benefits), the old have no reason to raise transfers to offset fully the government's actions. Instead, the old end up better off at the expense of the young, and aggregate consumer demand rises. Then, as in the standard approach, real interest rates increase or domestic residents borrow more from abroad.

One shortcoming of this approach is that it treats the interaction between parents and children as equivalent to the purchases of services on markets. In this setting parents would tend to pay wages to children, rather than using bequests or other forms of intergenerational transfers. These features—as well as the observation that most parents seem to care about their children's welfare—can be better explained by introducing altruism along with a desire to influence children's behavior. In this case Ricardian equivalence may or may not obtain. Consider the utility that a parent would allocate to his or her child if there were no difficulty in motivating the child to perform properly. Suppose that the parent can design a credible threat involving bequests that entails the loss of some part of this utility for the child. (Note that if no threats are credible, the whole basis for strategic bequests disappears.) If the threat is already large enough to induce the behavior that the parent desires, Ricardian equivalence still holds. For example, if the government runs a budget deficit, the parent provides offsetting transfers to the child, and thereby preserves the child's level of utility, as well as the behavior sought by the parent. On the other hand, the parent may have to allow excess utility to the child to secure a sufficient threat against bad performance. Then a budget deficit enables the parent to reduce the child's utility (as desired), while maintaining or even enhancing the threat that influences behavior. In this case Ricardian equivalence would not hold.

Other economists argue that the uncertainty of the time of death makes many bequests unintended, and that such bequests would not respond very much to budget deficits. The imperfection of private annuity markets is usually mentioned to explain

why unintended bequests are significant. But this reasoning is backwards, since annuities do not entail greater adverse selection problems than many other types of insurance. The small amount of private annuities outstanding, other than the substantial amount in the form of pensions, reflects primarily a lack of demand, which itself is an indication that people desire to make the most of the bequests that occur. In any event, since the Ricardian results involve a broad concept of intergenerational transfers, rather than especially bequests at death, a focus on formal bequests is misplaced.

Imperfect Loan Markets

Many economists argue that the imperfection of private credit markets is central to an analysis of the public debt; see, for example, Robert Mundell (1971). To consider this argument, assume that a closed economy consists of two types of infinite-lived economic agents; those of group A who have the same discount rate, r , as the government (and are therefore willing to hold the government's debt), and those of group B who have the higher discount rate, $\tilde{r} > r$. The constituents of group A would include large businesses, pension funds, and some individuals. The members of group B, such as small businesses and many households, possess poor collateral; therefore, loans to these people imply large costs of evaluation and enforcement. It follows that the members of group B face higher borrowing rates (even after an allowance for default risk) than the government. Whether or not they are actually borrowing, the high discount rate \tilde{r} for group B corresponds to a high rate of time preference for consumption and a high marginal return on investment.

Suppose that the government cuts current taxes and runs a budget deficit. Further, assume that the division of the tax cut between groups A and B—say fifty-fifty—is the same as the division of the higher future taxes needed to service the extra debt. Since those from group A experience no net change in wealth, they willingly hold their share of the extra public debt. For group B, where the discount rate \tilde{r} exceeds r , the present value of the extra future taxes falls short of the tax cut. The members of this group are better off because the tax cut effectively enables them to borrow at the lower interest rate, r . This cut in the effective borrowing rate motivates the members of group B to raise current consumption and investment.

In the aggregate a budget deficit now raises aggregate demand, or equivalently, the aggregate of desired private saving increases by less than one-to-one with the government's deficit. It follows that the real interest rate r , which applies to group A and the government, must rise to induce people to hold the extra public debt. Hence there is crowding out of consumption and investment by members of group A. For group B, the opportunity to raise current consumption and investment means that the rate of time preference for consumption and the marginal return to investment would decline. That is, the discount rate \tilde{r} falls. Thus, the main effects are a narrowing of the spread between the two discount rates, r and \tilde{r} , and a diversion of current expenditures from group A to group B. In the aggregate investment may either rise or fall, and the long-term effect on the capital stock is uncertain. The major change, however,

is a better channeling of resources to their ultimate uses. Namely the persons from group B—who have relatively high values for rates of time preference and for marginal returns to investment—command a greater share of current output. In any event the outcomes are non-neutral, and in that sense non-Ricardian.

The important finding from the inclusion of imperfect loan markets is that the government's issue of public debt can amount to a useful form of financial intermediation. The government induces people with good access to credit markets (group A) to hold more than their share of the extra public debt. Those with poor access (group B) hold less than their share, and thereby effectively receive loans from the first group. This process works because the government implicitly guarantees the repayment of loans through its tax collections and debt payments. Thus loans between A and B take place even though such loans were not viable (because of “transaction costs”) on the imperfect private credit market.

This much of the argument may be valid, although it credits the government with a lot of skill in the collection of taxes from people with poor collateral (which is the underlying source of the problem for private lenders). Even if the government possesses this skill, the conclusions do not resemble those from the standard analysis. As discussed before, budget deficits can amount to more financial intermediation, and are in that sense equivalent to a technological advance that improves the functioning of loan markets. From this perspective it is reasonable to find a reduced spread between various discount rates and an improvement in the allocation of resources. If the government really is better at the process of intermediating, more of this activity—that is, more public debt—raises perceived wealth because it actually improves the workings of the economy.

In the preceding analysis, the imperfection of credit markets reflected costs of enforcing the collection of loans. A different approach, followed by Toshiki Yotsuzuka (1987) in his extension of the models of Mervyn King (1986) and Fumio Hayashi (1987), allows for adverse selection among borrowers with different risk characteristics. Individuals know their probabilities of default, but the lenders' only possibility for learning these probabilities comes from observing the chosen levels of borrowing at going interest rates. In this setting the government's borrowing amounts to a loan to a group that pools the various risk classes. Such borrowing matters if the private equilibrium does not involve similar pooling. However, by considering the incentives of lenders to exchange or not exchange information about their customers, Yotsuzuka argues that the private equilibrium typically involves a pooled loan of limited quantity at a relatively low interest rate. Then the high-risk types may borrow additional amounts at a high interest rate. (The assumption is that this additional borrowing is not observable by other lenders.) In this case the government's borrowing replaces the private pooled lending, and leads to no real effects. That is, Ricardian equivalence holds despite the imperfect private loan market where high-risk people face high marginal borrowing rates. The general lesson again is that Ricardian equivalence fails because of imperfect credit markets only if the government does things in the loan market that are different from, and perhaps better than, those carried out privately.

Uncertainty about Future Taxes and Incomes

Some economists argue that the uncertainty about individuals' future taxes—or the complexity in estimating them—implies a high rate of discount in capitalizing these future liabilities (Martin Bailey, 1971, pp. 157–58; James Buchanan and Richard Wagner, 1977, pp. 17, 101, 130; Martin Feldstein, 1976, p. 335). In this case, a substitution of a budget deficit for current taxes raises net wealth because the present value of the higher expected future taxes falls short of the current tax cut. It then follows that budget deficits raise aggregate consumer demand and reduce desired national saving.

A proper treatment of uncertainty leads to different conclusions. Louis Chan (1983) first considers the case of lump-sum taxes that have a known distribution across households. However, the aggregate of future taxes and the real value of future payments on public debt are subject to uncertainty. In this case a deficit-financed tax cut has no real effects. Individuals hold their share of the extra debt because the debt is a perfect hedge against the uncertainty of the future taxes. (This analysis assumes that private credit markets have no “imperfections” of the sort discussed earlier.)

Suppose now that future taxes are still lump sum but have an uncertain incidence across individuals. Furthermore, assume that there are no insurance markets for relative tax risks. Then a budget deficit tends to increase the uncertainty about each individual's future disposable income. Chan (1983, p. 363) shows for the “usual case” (of non-increasing absolute risk aversion) that people react by reducing current consumption and hence, by raising current private saving by more than the tax cut. Consequently, the effects on real interest rates, investment, the current account, and so on are the opposites of the standard ones.

The results are different for an income tax (Chan, 1983, pp. 364–366; Robert Barsky, Gregory Mankiw and Stephen Zeldes, 1986). Suppose that each person pays the tax τy_i , where y_i is the person's uncertain future income. Suppose that there are no insurance markets for individual income risks, and that τ is known. (The analysis thus abstracts from uncertainties in relative tax rates across individuals.) In this case a budget deficit raises the future value of τ and thereby reduces the uncertainty about each individual's future disposable income. In effect, the government shares the risks about individual disposable income to a greater extent. It follows that the results are opposite to those found before; namely, a budget deficit tends to raise current consumption and hence, to raise private saving by less than the tax cut.

Overall, the conclusions depend on the net effect of higher mean future tax collections on the uncertainty associated with individuals' future disposable incomes. Desired national saving tends to rise with a budget deficit if this uncertainty increases, and vice versa.

The Timing of Taxes

Departures from Ricardian equivalence arise also if taxes are not lump sum; for example, with an income tax. In this situation, budget deficits change the timing of income taxes, and thereby affect people's incentives to work and produce in different

periods. It follows that variations in deficits are non-neutral, although the results tend also to be inconsistent with the standard view.

Suppose, for example, that the current tax rate on labor income, τ_1 , declines, and the expected rate for the next period, τ_2 , rises. To simplify matters, assume that today's budget deficit is matched by enough of a surplus next period so that the public debt does not change in later periods. Because the tax rate applies to labor income, households are motivated to work more than usual in period 1 and less than usual in period 2. Since the tax rate does not apply to expenditures (and since wealth effects are negligible here), desired national saving rises in period 1 and falls in period 2. Therefore, in a closed economy, after-tax real interest rates tend to be relatively low in period 1—along with the budget deficit—and relatively high in period 2—along with the surplus. In an open economy, a current-account surplus accompanies the budget deficit, and vice versa. Hence the results are non-Ricardian, but also counter to the standard view. (Temporary variations in consumption taxes tend to generate the standard pattern where real interest rates, current-account deficits, and budget deficits are positively correlated.)

Unlike in the Ricardian case where debt and deficits do not matter, it is possible in a world of distorting taxes to determine the optimal path of the budget deficit, which corresponds to the optimal time pattern of taxes. In effect, the theory of debt management becomes a branch of public finance; specifically, an application of the theory of optimal taxation.

One result is that budget deficits can be used to smooth tax rates over time, despite fluctuations in government expenditures and the tax base.⁵ For example, if time periods are identical except for the quantity of government purchases—which are assumed not to interact directly with labor supply decisions—optimality dictates uniform taxation of labor income over time. This constancy of tax rates requires budget deficits when government spending is unusually high, such as in wartime, and surpluses when spending is unusually low.

Constant tax rates over time will not be optimal in general; for example, optimal tax rates on labor income may vary over the business cycle. To the extent that some smoothing is called for, budget deficits would occur in recessions, and surpluses in booms. If optimal tax rates are lower than normal in recessions and higher than normal in booms, the countercyclical pattern of budget deficits is even more vigorous. The well-known concept of the full-employment deficit, as discussed in E. Cary Brown (1956) and Council of Economic Advisers (1962, pp. 78–82), adjusts for this cyclical behavior of budget deficits.

The tax-smoothing view has implications for the interaction between inflation and budget deficits if the public debt is denominated in nominal terms. Basically, the fiscal authority's objective involves the path of tax rates and other real variables. Therefore, other things equal, a higher rate of expected inflation (presumably reflecting a higher rate of monetary growth) motivates a correspondingly higher growth rate

⁵For discussions of the tax-smoothing model of budget deficits, see A. C. Pigou (1928, Chapter 6) and Robert Barro (1979, 1986).

of the nominal, interest-bearing debt. This response keeps the planned path of the real public debt invariant with expected inflation. This behavior means that differences in expected rates of inflation can account for substantial variations in budget deficits if deficits are measured in the conventional way to correspond to the change in the government's nominal liabilities. This element is, however, less important for an inflation-adjusted budget deficit, which corresponds to the change in the government's real obligations (Jeremy Siegel, 1979; Robert Eisner and Paul Pieper, 1984).

With perfect foresight, the strict tax-smoothing model implies constant tax rates. More realistically, new information about the path of government spending, national income, and so on, would lead to revisions of tax rates. However, the sign of these revisions would not be predictable. Thus, in the presence of uncertainty, tax smoothing implies that tax rates would behave roughly like random walks.

It is possible to use the tax-smoothing approach as a positive theory of how the government operates, rather than as a normative model of how it should act.⁶ Barro (1979, 1986) shows that this framework explains much of the behavior of U.S. federal deficits from 1916 to 1983, although the deficits since 1984 turn out to be substantially higher than predicted. Over the full sample, the major departures from the theory are an excessive reaction of budget deficits to the business cycle (so that tax rates fall below "normal" during recessions) and an insufficient reaction to temporary military spending (so that tax rates rise above normal during wars). These departures are found also by Chaipat Sahasakul (1986), who looks directly at the behavior of average marginal tax rates. Barro (1987, Section 3) finds for the British data from the early 1700s through 1918 that temporary military spending is the major determinant of budget deficits. Also, unlike the U.S. case, the results indicate a one-to-one response of budget deficits to temporary spending.

Full Employment and Keynesian Models

A common argument is that the Ricardian results depend on "full employment," and surely do not hold in Keynesian models. In standard Keynesian analysis (which still appears in many textbooks), if everyone thinks that a budget deficit makes them wealthier, the resulting expansion of aggregate demand raises output and employment, and thereby actually makes people wealthier. (This result holds if the economy begins in a state of "involuntary unemployment.") There may even be multiple, rational expectations equilibria, where the change in actual wealth coincides with the change in perceived wealth.

This result does not mean that budget deficits increase aggregate demand and wealth in Keynesian models. If we had conjectured that budget deficits made people feel poorer, the resulting contractions in output and employment would have made them poorer. Similarly, if we had started with the Ricardian notion that budget deficits did not affect wealth, the Keynesian results would have verified that conjecture. The odd feature of the standard Keynesian model is that *anything* that makes people feel wealthier actually makes them wealthier (although the perception and

⁶A colleague of mine argues that a "normative" model should be defined as a model that fits the data badly.

actuality need not correspond quantitatively). This observation raises doubts about the formulation of Keynesian models, but says little about the effect of budget deficits. Moreover, in equilibrium models that include unemployment (such as models with incomplete information and search), there is no clear interplay between the presence of unemployment and the validity of the Ricardian approach.

Empirical Evidence on the Economic Effects of Budget Deficits

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

The Ricardian and standard views have different predictions about the effects of fiscal policy on a number of economic variables. The next three sections summarize the empirical evidence on interest rates, saving, and the current-account balance.

Interest Rates

The Ricardian view predicts no effect of budget deficits on real interest rates, whereas the standard view predicts a positive effect, at least in the context of a closed economy. Many economists have tested these propositions empirically (for a summary, see U.S. Treasury Department, 1984). Typical results show little relationship between budget deficits and interest rates. For example, Charles Plosser (1982, p. 339) finds for quarterly U.S. data from 1954 to 1978 that unexpected movements in privately-held federal debt do not raise the nominal yield on government securities of various maturities. In fact, there is a weak tendency for yields to decline with innovations in federal debt. Plosser's (1987, tables VIII and XI) later study, which includes data through 1985, reaches similar conclusions for nominal and expected real yields. Paul Evans (1987b) obtains similar results for nominal yields with quarterly data from 1974 to 1985 for Canada, France, Germany, Japan, the United Kingdom, and the United States.

Evans (1987a, Tables 4–6) finds for annual U.S. data from 1931 to 1979 that current and past real federal deficits have no significant association with nominal interest rates on commercial paper or corporate bonds, or with realized real interest rates on commercial paper. Over the longer period from 1908 to 1984, using monthly data, there is some indication of a negative relation between deficits and nominal or real interest rates (Evans, 1987a, Tables 1–3). Evans also explores the effects of expected future budget deficits or surpluses. He assumes that people would have expected future deficits in advance of tax cuts, such as in 1981, and future surpluses in advance of tax hikes. But interest rates turn out typically not to rise in advance of tax cuts and not to fall in advance of tax hikes.

Overall, the empirical results on interest rates support the Ricardian view. Given these findings it is remarkable that most macroeconomists remain confident that budget deficits raise interest rates.

Consumption and Saving

Many empirical studies have searched for effects of budget deficits or social security on consumption and saving. Most of these studies—exemplified by Levis Kochin (1974) and the papers surveyed in Louis Esposito (1978)—rely on estimates of coefficients in consumption functions. Basically, the results are all over the map, with some favoring Ricardian equivalence, and others not.

The inconclusive nature of these results probably reflects well-known identification problems. The analysis does not deal satisfactorily with the simultaneity between consumption and income, and also has problems with the endogeneity of budget deficits. For example, deficits and saving (or investment) have strong cyclical elements, and it is difficult to sort out the causation in these patterns. Because of these problems, I regard as more reliable some results that exploit situations that look more like natural experiments.

One such study, a comparison of saving in Canada and the United States, was carried out by Chris Carroll and Lawrence Summers (1987). 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 net national saving rates in the two countries appeared to be invariant with the relative values of the budget deficits. These results are particularly interesting because the focus on relative performance in Canada and the United States holds constant the many forces that have common influences on the two countries. It may be that this procedure lessens the problems of identification that hamper most studies of consumption functions.

Recent fiscal policy in Israel comes close to a natural experiment for studying the interplay between budget deficits and saving.⁷ In 1983 the gross national saving rate of 13 percent corresponded to a private saving rate of 17 percent and a public saving rate of -4 percent. In 1984 the dramatic rise in the budget deficit led to a public saving rate of -11 percent. (A principal reason for the deficit was the adverse effect of the increase in the inflation rate on the collection of real tax revenues.) For present purposes, the interesting observation is that the private saving rate rose from 17 percent to 26 percent, so that the national saving rate changed little; actually rising from 13 percent to 15 percent. Then the stabilization program in 1985 eliminated the budget deficit, along with most of the inflation, so that the public saving rate increased from -11 percent in 1984 to 0 in 1985–86 and -2 percent in 1987. The private saving rate decreased dramatically at the same time—from 26 percent in 1984 to 19 percent in 1985 and 14 percent in 1986–87. Therefore, the national saving rates were relatively stable, going from 15 percent in 1984 to 18 percent in 1985, 14 percent in

⁷I am grateful to Ed Offenbacher for calling my attention to the Israeli experience. The data, all expressed in U.S. dollars, are from Bank of Israel, 1987.

1986, and 12 percent in 1987. The main point is that this evidence reveals the roughly one-to-one offset between public and private saving that the Ricardian view predicts.

Finally, I should note the “Reagan experiment,” which featured large U.S. budget deficits from 1984 to 1987 during a peacetime boom. (While an interesting experiment—applauded on scientific grounds even by opponents of Reagan—the magnitudes are much less dramatic than those in Israel.) Unfortunately, the effects of recent U.S. budget deficits on U.S. investment and saving are controversial, especially because it is unclear whether recent investment and saving rates are high or low.

National accounts measures of rates of net investment and net national saving are low, and have often been cited. But the ratio of real gross investment (broadly defined to include purchases of consumer durables) to real GNP averaged 27.9 percent from 1984 to 1987, as compared to an average of 23.8 percent from 1947 to 1987. In fact, the recent investment ratios represent a post-World War II high. If saving is measured (as I would argue is appropriate) by the change in the real market value of assets, recent saving rates have not been low. For example, the change in real household net worth as a ratio to real GNP averaged 11.2 percent from 1984 to 1987, as compared to a mean of 10.1 percent from 1949 to 1987.⁸ Thus, while a good portion of recent U.S. budget deficits may qualify as exogenous, it is not yet clear how these deficits affected U.S. investment and saving.

Current-Account Deficits

Popular opinion attributes the large current-account deficits in the United States since 1983 to the effects of budget deficits. Figure 1 shows the values since 1948 of the ratio of the total government budget surplus (national accounts’ version) to GNP (solid line) and the ratio of net foreign investment to GNP (dotted line).⁹ Through 1982 there is no association between these two variables (correlation = $-.02$). However, including the data since 1983 raises the correlation to $.37$. In effect, the U.S. data since World War II reveal a single incident—the period since 1983—when budget and current-account deficits have been high at the same time. While this recent co-movement is interesting, it does not by itself provide strong support for the view that budget deficits cause current account deficits.

Evans (1988, Tables 1–5) carried out a cross-country empirical investigation of the relation between budget and current account deficits. He looked first at annual, post-World War II data for Canada, with the United States used as a proxy for the rest of the world. (In a model where budget deficits matter, the current account deficit responds to the home country’s budget deficit relative to the budget deficit in the rest

⁸Household net worth comes from Board of Governors of the Federal Reserve System, 1988. The nominal year-end figures were divided by the fourth-quarter GNP deflator. The Federal Reserve numbers include stocks, housing, and consumer durables at estimated market value, but bonds at par value. I made no adjustments for households’ liabilities for future taxes associated with the government’s debt net of assets. There is a conceptual problem here because some of this liability is already reflected in the market values of households’ stocks, housing, and so on. Also, the Federal Reserve’s measures of government liabilities and assets are not well developed.

⁹The data are quarterly, seasonally-adjusted values from Citibase. The results are similar if the federal surplus is used instead of the total government surplus.

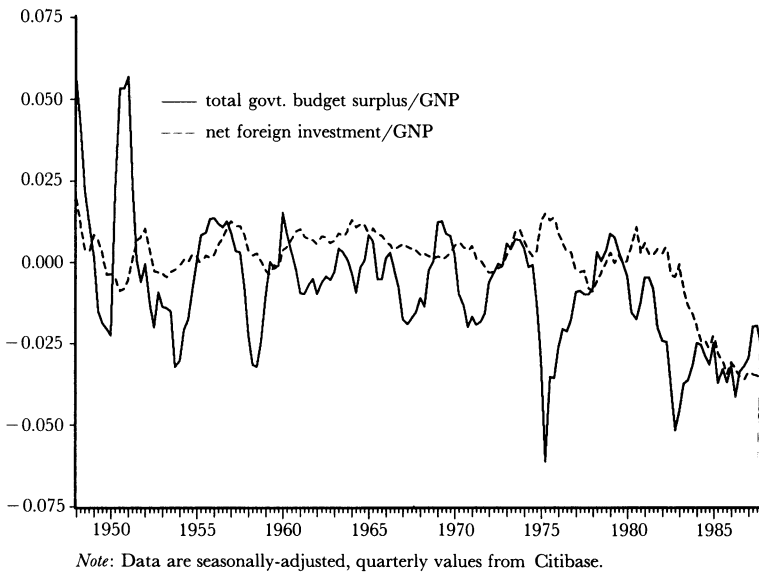


Fig. 1. U.S. Budget and Current-Account Surpluses, 1948–1987.

of the world.) Then he looked at quarterly data since 1973 on the United States, Canada, France, Germany, and the United Kingdom, with the aggregate of the major industrialized countries (other than the country under study) used to represent the rest of the world. Evans's overall finding is that the results are consistent with the Ricardian hypothesis that current-account balances are independent of budget deficits. (Only the estimates for Germany suggest a positive relation between budget and current account deficits, but the results in this case are not statistically significant.) Evans (p. 31) reacts to his findings with the question, "If large U.S. budget deficits did not produce the large U.S. current-account deficits of the 1980s, what did?" and concludes that this question is an interesting topic for future research.

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 differential taxation in the theory of public finance is second order in the same sense. However, careful analysis of these effects tends to deliver predictions about budget deficits that differ from those of standard macroeconomic models.

I have argued that empirical findings on interest rates, consumption and saving, and the current-account balance tend mainly to support the Ricardian viewpoint. However, this empirical analysis involves substantial problems about data and identification, 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 lean 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 go on to argue that it is either theoretically or empirically in error. I predict that this trend will continue and that the Ricardian approach will become the benchmark model for assessing fiscal policy.

There is a parallel between the Ricardian equivalence theorem on intertemporal government finance and the Modigliani-Miller (1958) theorem on corporate finance. Everyone knows that the Modigliani-Miller theorem is literally incorrect in saying that the structure of corporate finance does not matter. But the theorem rules out numerous sloppy reasons for why this structure might have mattered, and thereby forces theoretical and empirical analyses into a disciplined, productive mode. Similarly, I would not predict that most analysts will embrace Ricardian equivalence in the sense of concluding that fiscal policy is irrelevant. But satisfactory analyses will feature explicit modeling of elements that lead to departures from Ricardian equivalence, and the predicted consequences of fiscal policies will flow directly from these elements.

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