

NBER WORKING PAPER SERIES

GOVERNMENT DEFICITS AND AGGREGATE DEMAND

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Working Paper No. 435

NATIONAL BUREAU OF ECONOMIC RESEARCH
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January 1980

I am very grateful to James Poterba for his help with the calculations and to the NBER and the National Science Foundation for financial support. This paper was prepared for the Tulane Conference on Government Debt, Fiscal Policy, and expectational theory. The research reported here is part of the NBER's research program in Economic Fluctuations. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

The evidence presented in this paper indicates that changes in government spending, transfers and taxes can have substantial effects on aggregate demand. The estimates also indicate that the promise of future social security benefits significantly reduces private saving. Each of the basic implications of the so-called "Ricardian equivalence theorem" is contradicted by the data. The results are consistent with the more general view of the effects of fiscal actions and fiscal expectations that is described in the paper.

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Government Deficits and Aggregate Demand

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Government deficits are not the only way in which fiscal policy affects aggregate demand. Changes in the tax rates that provide incentives or disincentives to different kinds of spending have been and can continue to be at least as important. The present paper nevertheless ignores these fiscal incentives in order to focus on the direct demand effects of the "nondistortionary" aspects of changes in government expenditure, transfers and taxes. More specifically, the paper examines whether the power of such policies is reduced or eliminated by the way in which consumers react to the policies themselves or to the resulting change in government debt.

The early Keynesian analysis was based on the extreme assumption that fiscal policies affect consumption only through their impact on current disposable income. This view implied powerful and predictable effects of tax reductions, transfers and deficit-financed government spending. Over the years, this view has been modified in two important ways. First, the profession now recognizes that the extent of this fiscal stimulus is limited by the

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monetary feedbacks through higher interest rates, reduced real money balances and changes in portfolio composition. Second, we have learned from Friedman (1957), Modigliani (1954) and others that it is important to distinguish between transitory and permanent changes in income and therefore that consumers' response to a change in taxes or transfers depends on how long that change is expected to persist. Although there is disagreement about the quantitative implications of these two points, the general qualitative conclusions are now universally accepted.

More recently, several economists have revived a very old argument about the equivalence of debt and taxes that implies that government deficits have no effect on aggregate demand.¹ More specifically, the "pre-Ricardian equivalence hypothesis"² asserts that consumers respond in exactly the same way to a change in taxes and a change in the government deficit. A tax cut that leads to a change in the government deficit therefore has no effect on consumer demand. This "ex ante crowding out" makes the more general crowding out through interest rates, real balances and portfolio effects irrelevant. A similar line of reasoning leads to the conclusions that transfer payments financed by deficits have no effect on

¹The revival of this idea is due to Bailey (1971), Barro (1974), Kochin (1974), Miller and Upton (1974), and Tanner (1979a,b).

²I think the label "pre-Ricardian" is preferable to "Ricardian" because Ricardo himself made a point of rejecting this equivalence argument which had been suggested by others. As O'Driscoll (1977) has pointed out, Ricardo (1951, 4:187) wrote "This argument of charging posterity with the interest on our debt, or of relieving them from a portion of such interest, is often used by otherwise well informed people, but I confess I see no weight in it." (My emphasis.) I shall refer to it as a "hypothesis" or "proposition" rather than a "theorem" to avoid the implication that it is provable and true.

demand and that the promise of future social security retirement benefits does not increase current consumption. Barro (1979) summarizes these implications of fiscal impotence in the concluding paragraph of a recent paper: "It seems fair to say that neither economic theories nor empirical analyses provide convincing supporting evidence for the effectiveness of fiscal policy. The area of fiscal policy exhibits a wide gap between, on the one hand, the weight of theory and evidence, and, on the other hand, the general opinion of professional economists and policymakers." (p. 21).

My reading of the evidence and analysis of the theoretical issues leads to quite different conclusions. I believe that the pre-Ricardian view greatly exaggerates the public's perception of and response to the future tax obligations implied by existing government debt. The assertion of fiscal impotence is therefore quite unwarranted. On the contrary, a more general theory implies and the evidence indicates that consumers do not regard taxes and transfers as equivalent to changes in debt and that they do regard both government debt and future social security benefits as net wealth. Specific estimates in support of these conclusions are presented in the present paper.

Moreover, even if the pre-Ricardian equivalence proposition were true, changes in government deficits that result from changes in government spending could affect aggregate demand. Only if any change in the government deficit induced an equal concurrent change in private saving would government expenditure have no effect on demand. While an increase in the government debt would, according

to the pre-Ricardian view, make households feel poorer and would therefore decrease their consumption, there is no reason why the entire change in wealth should be eliminated in a single year. The explicit estimates presented below suggest that the magnitude of this form of ex ante crowding out is relatively small.

While the pre-Ricardian view puts too much emphasis on the future tax liabilities that are needed to service the existing debt, both the pre-Ricardian view and the conventional Keynesian analysis overlook a different link between current fiscal policies and future tax liabilities. A rise in government spending in one year may cause the public to expect higher spending in future years and therefore higher taxes to finance that spending. Similarly, a rise in current taxes may cause individuals to revise their expectations of future taxes in the same direction. Section 1 examines briefly the nature and significance of the process by which households respond to these "fiscal signals" by revising their expectations and adjusting their spending.

The way in which any fiscal action affects current consumer spending therefore depends on the resulting change in expectations about future government spending as well as on its effect on concurrent disposable income and anticipated debt-service obligations. Moreover, the change in expectations and spending that results from any given fiscal action will differ from one time to another in a way that depends on the whole history of previous fiscal actions and on the recent and past legislative debates. It is therefore impossible to predict with accuracy how consumers' spending will respond to the fiscal change in a particular year. This uncertainty

and variability of response has important implications for macroeconomic policy and for the econometric testing of the pre-Ricardian proposition.

The lack of a stable and predictable response implies that it is not appropriate to use changes in taxes and government spending for year-to-year demand management. Fiscal policies are suitable for a situation like the 1930's but not for smoothing the minor fluctuations during the 1960's and 1970's.

The variable response of consumption to fiscal signals implies that econometric analysis cannot estimate "the" consumption function but only the average effects on consumer spending of changes in government spending, in taxes and in transfers. Although such estimates do not provide enough information to guide short-run macroeconomic policy, they are in principle sufficient to test the hypotheses of fiscal impotence and the pre-Ricardian equivalence proposition. The estimates presented below provide clear evidence against the pre-Ricardian view and in favor of the effectiveness of fiscal policy.

1. Fiscal Expectations and Consumer Spending

The effectiveness of fiscal policy depends crucially on the way in which the consumer links a current fiscal change to his future tax liabilities and how these anticipated liabilities affect his current behavior. The pre-Ricardian hypothesis focuses exclusively on the future taxes that will be required to service the debt that results from current fiscal action. The "fiscal expectations" approach that I will now describe emphasizes that a current rise in government spending or taxes is likely to imply a higher future level of spending and taxes quite apart from any debt service obligations. These two views have quite different implications about the effectiveness of fiscal policy.

This section begins by commenting briefly on why the pre-Ricardian hypothesis is likely to be less important than its proponents argue. I then discuss the nature and implications of the fiscal expectations approach. The next section then states five testable implications of the fiscal impotence and pre-Ricardian views that will provide the basis for the empirical work of the current paper.

The pre-Ricardian hypothesis is based on the fact that a dollar of tax reduction creates an extra dollar of national debt that must eventually be repaid or serviced by interest payments with the same present value. The tax "reduction" is thus really only a tax "postponement." Since there is no change in the present value of the tax liabilities, there should be no change in consumer

spending. While this argument has been known for a long-time, it has been rejected on the ground that much or all of the future tax liability could be avoided by the current generation of consumers by refinancing the principal and interest with additional debt issues. Although the debt might eventually be repaid or serviced by tax-financed interest payments, this tax burden can be shifted to future generations.¹

The ingenious feature of the revived pre-Ricardian argument is the proposition that individuals will act as if they will live forever because they are linked to future generations through a chain of bequests. If a current taxpayer plans to leave a bequest to his children, a decrease in his own tax and corresponding increase in the tax on his children (with the same present value) will cause him to increase his bequest. Indeed, to return to the initial equilibrium, the taxpayer must save the entire initial tax reduction. The substitution of debt for taxes therefore has no effect on current demand since the government's dissaving is just offset by the individual's increased saving. A similar argument applies even if repayment of the debt will be postponed for many generations. Even if the current taxpayer does not care about the

¹There are several other objections to the asserted equivalence of debt and taxes; see Buiter and Tobin (1978) and Barro (1979). I regard the liquidity effect of the tax cut and the difference between the government borrowing rate and private borrowing rates as the two most significant of these additional objections. I will not discuss any of these issues in the present paper in order to focus on the contrasting views of expected future taxes.

well-being of his great grandchildren, he will act as if he does if each successive generation will plan to make a positive bequest to the next generation. The current taxpayer will save the entire tax reduction in order to keep the consumption level of all of his future heirs unchanged.

The degree of foresight and rationality required by this process clearly strains the credibility of the analysis. There are two additional and more fundamental reasons for rejecting the conclusion that intergenerational altruism implies fiscal neutrality. First, it is wrong to assume that parents who are concerned about the utility of their children will necessarily wish to leave bequests. A parent who believes that, because of generally rising productivity and real incomes, his children will be richer than himself, may well decide that the optimal "bequest" is negative, i.e., a transfer from his children to himself. Since this decision cannot be enforced, the constrained optimum for the parent is no bequest. This may remain the parent's chosen position after a tax reduction and a corresponding increase in the national debt. It is clear that, for the vast majority of the population, there are no significant bequests to children. Moreover, many of the observed bequests are unintended in the sense that the individuals had expected to consume more of their wealth and leave a smaller estate. Without the "interior solution" of positive intended bequests for the current generation and for all future generations, the "infinite life" character of current decision making is lost

and the pre-Ricardian proposition is false.

Second, even if taxpayers respond to a tax reduction by an offsetting transfer to the next generation, the form of the transfer is very important. Barro and others recognize that their theory appears to be contradicted by the relative unimportance of bequests and note that there nevertheless are intergenerational transfers because parents make voluntary contributions to children in the form of educational investments and other expenses in the home. However, unlike saving for additional bequests, such in-kind transfers involve additional spending. Thus even a perfectly offsetting intergenerational transfer is consistent with the conclusion that a tax reduction can increase current consumer spending.

When we drop the extreme assumption that individuals respond to fiscal changes as if they expect to live forever, it is clear that a one-time tax cut represents an increase in lifetime wealth. A one-time tax cut taken in itself would therefore be expected to cause a small increase in consumption in the current year and in future years as well.¹ A tax cut that is known to be permanent would of course imply a much larger increase in lifetime wealth and would therefore induce a much larger immediate increase in consumption.

More generally, households cannot classify tax changes as unambiguously temporary or permanent. Tax liabilities in future

¹Binding liquidity constraints for any of the individuals whose taxes are reduced would increase the magnitude of the short-run response.

years must be regarded as unknown and current spending decisions must be made in the context of uncertainty about future taxes and pretax incomes. An important aspect of a tax change in any year and the associated legislative debate is that it causes households to revise their expectations about future tax liabilities.

The response of household consumption to any tax change can be formally regarded as a two-step process. First, each household revises its subjective probability distribution of all its future tax liabilities. Second, it sets the level of current consumption to maximize expected utility (over its whole lifetime, including the utility value of bequests) using the revised subjective probability distribution of future taxes and incomes.¹ The response to a particular tax change in a year is therefore not a fixed constant "propensity to consume" but an amount that varies with current conditions, previous fiscal policies, the legislative debate, etc. The more that a given change in taxes is taken as a signal that future taxes will change in the same direction, the greater will be the consumers' initial response. The evidence presented in

¹Note in particular that the entire subjective distribution matters and not just the vector of mean values. This has important implications for the Flaven - Hall - Sargent analysis of consumer behavior. In general, the specific past history of income and taxes will be relevant for updating the subjective distribution. When this is true, the change in consumption from one year to the next will depend not only on the current income and tax variables but also on the path of previous observations. This may explain why the evidence of Bilson and subsequent currently unpublished work by Hall and Mishkin does not support their original expectations.

section 3 suggests that the average response to tax changes has been smaller than traditional Keynesian theory suggests but substantial enough to refute the pre-Ricardian claim of fiscal impotence.

The effect of an increase in current government spending also depends on the resulting increase in expected future tax liabilities.¹ The traditional Keynesian analysis ignores the "signal" aspect of a spending increase and therefore assumes that a change in government spending implies no change in anticipated future taxes. Consumer spending is therefore not altered.² The pre-Ricardian approach focuses exclusively on the increased debt that results from the government spending and therefore on the need for higher future taxes to repay the debt. Neither of these is a realistic description of how an increase in government spending changes the public's anticipation of future taxes.

To the extent that consumers expect an increase in government

¹I am abstracting from the role of government spending as a substitute for or compliment to private spending. Depending on the particular type of public spending, it can substitute for current private consumption and stimulate saving (e.g., public tennis courts) or it can substitute for future private consumption and therefore reduce saving (e.g., public nursing homes). Compliments to current or future private consumption would have the opposite effect.

²There is of course the possibility of changes in consumer spending that result from changes in interest rates, real balances or portfolio composition. As I noted in the introduction, such "second round" effects are ignored throughout this paper in order to focus on ex ante crowding out.

spending to persist and to be financed by future taxes, they will associate a higher level of future taxes with a current increase in government spending. The tendency of government programs to continue indefinitely and the presumption against permanent budget deficits together imply that a current rise in government spending, even though it is not accompanied by a concurrent rise in taxes, will entail an equal permanent rise in taxes. This in itself implies a quite substantial fall in the taxpayers' real "wealth" and therefore a fall in current consumption. This reduction in the public's wealth is offset to the extent that the future government spending provides services of value. The effect on consumption of an increase in government spending depends on the resulting change in net wealth and on the specific role of government spending as a substitute or compliment to current and future consumption.

All of this implies that the response of consumers to current changes in government spending cannot be determined a priori on the basis of the effects of government deficits alone. Previous studies¹ that assumed that increases in government spending and decreases in taxes would have the same effect on consumer spending therefore introduced an artificial constraint. Although econometric evidence cannot provide a precise measure of the effects of different types of spending changes, the evidence prescribed in section 3 indicates that government spending has on average had relatively little effect on

¹For example, Kochin (1974) and Tanner (1979).

private consumption. Changes in government spending therefore appear to raise or reduce aggregate demand nearly dollar for dollar.

In concluding this discussion of "fiscal expectations," it is useful to emphasize the complexity of the changes in expectations that can result from each fiscal action. In formal terms, individuals respond to a fiscal signal by changing their subjective probability distributions for all future taxes and expenditures. It is not possible to represent these distributions by single-valued "expected tax" and "expected government spending" variables. Similarly, the conventional process of classifying tax changes as "temporary" or "permanent" is much too simple and arbitrary a representation of the complex change in expectations.

2. Five Testable Implications of Fiscal Impotence

The pre-Ricardian equivalence hypothesis has four implications that can be tested directly with aggregate data on household consumption. The more extreme fiscal impotence proposition that even government spending does not add to aggregate demand entails a further testable implication within this framework. The present section discusses these five implications and describes the tests that will be reported in section 3.

Each of the five implications refers to the effect of some fiscal variable on consumer spending. The specific framework of the analysis is a consumption expenditure function relating real per capita consumer expenditures to a measure of real permanent income, to real wealth as conventionally defined, and to various fiscal variables:¹

$$(1) \quad C_t = \beta_0 + \beta_1 Y_t + \beta_2 W_t + \beta_3 SSW_t + \beta_4 G_t + \beta_5 T_t \\ + \beta_6 TR_t + \beta_7 D_t$$

where C_t is consumer expenditure in year t , Y_t is

¹Another obvious candidate for inclusions in the equation would be the real net rate of interest. Although it is clearly very difficult to construct a useful series for this variable, Boskin's (1978) work indicates that progress on this is possible. My only excuse for not trying to include such a variable in the current study is the lack of an adequate series for the full sample period.

national income,¹ W_t is the market value of privately owned wealth at the beginning of year t ,² SSW_t is a measure of the value of future social security benefits (that will be discussed later in this section), G_t is government spending on goods and services (including federal, state and local governments), T_t is tax revenues, TR_t is government transfers to individuals, and D_t is the net debt of the federal, state and local governments. All variables are measured in constant 1972 dollars and are stated on a per capita basis.

The specification of equation 1 avoids the Keynesian restriction that consumer expenditure depends on disposable income and allows instead the more general possibility that the propensities to consume out of pretax income and out of tax reductions will not in general be equal. The discussion in the previous section of this paper made it clear that different consumption propensities are possible regardless of whether one accepts the

¹A more elaborate specification might divide national income into labor income and capital income or into personal income (net of transfers) and retained corporate profits. The division between labor and capital income poses problems for farm income, unincorporated businesses, etc. Previous studies suggest that the effective propensity to consume retained earnings may be quite close to the propensity to consume other types of income (see, e.g., Feldstein, 1973). The single national income variable is not only the simplest specification but also, since it is closest in spirit to the pre-Ricardian view that the household's cash receipts are not directly relevant to consumption, is the most suitable framework for testing the other implications of the pre-Ricardian hypothesis. The significance of retained earnings is tested directly in section 3.

²This wealth series is a slight improvement over the one that I have used in previous papers. For the period from 1953 through 1977, it is the beginning-of-year household net worth variable developed for the MIT-Penn-SSRC Model. (This variable, denoted VCN, was provided by Franco Modigliani.) For earlier years, the series is extrapolated backwards using the household wealth series that I used in previous studies and that is presented in Evans (1969). The new wealth series is presented in the Appendix to the current paper.

pre-Ricardian view that debt and taxes are equivalent or the more general fiscal expectations view.

I should note at this point that although I think that equation 1 is a useful and desirable specification, I do not believe that it is a complete or accurate model of consumer behavior. It is important therefore to emphasize that I have adopted it as the framework for the tests presented in this paper because it is a direct generalization of the equations used by Barro, Kochin and Tanner to support their claims that the data favor the pre-Ricardian hypothesis. More specifically, they relate consumer expenditure to the net government deficit rather than to the three fiscal variables, thus implicitly imposing the constraint that $\beta_4 = \beta_6 = -\beta_5$. They also use ordinary least squares estimation, thus implicitly assuming that the fiscal variables are exogenous. When these assumptions are dropped, the estimated parameters strongly contradict the pre-Ricardian hypothesis. Although the new estimates do not prove that the hypothesis is wrong, they do imply that the earlier estimates should be given no weight. The estimates to be presented in this paper leave no basis for asserting that the evidence favors the pre-Ricardian hypothesis of fiscal neutrality. As a minimum, the burden of proof now rests on those who support that view.

It is useful to begin with the strong form of the fiscal impotence view that even government spending does not increase aggregate demand. This implies that an increase in government spending by one dollar with all other variables constant must induce a one dollar reduction in consumer spending. In terms of equation 1, this implies that $\beta_4 = -1$. Although this is necessary for complete ex ante crowding out, it is not an implication of the pre-Ricardian equivalence hypothesis. The pre-Ricardian view suggests that β_4 is negative but presumably quite small since it reflects the first year response of households to a one dollar decrease in the wealth of a taxpayer whose economic life is effectively infinite. This small negative effect may be either reinforced or counterbalanced by the specific aspects of the expenditure itself.¹ Although the more general fiscal expectations approach is consistent with a wider range of responses, it cannot be distinguished from the pre-Ricardian approach on the basis of β_4 . The key question about β_4 is therefore whether or not it is equal to minus 1.

A key prediction of the pre-Ricardian hypothesis is that a change in taxes has no effect when the levels of government spending and transfers are held constant. According to this view, since an increase in taxes also lowers the size of the public debt, consumer spending remains unchanged; in terms of equation 1, $\beta_5 = 0$. This stands in sharp contrast to the more general fiscal expectations view that a tax increase depresses consumption to an extent that

¹See footnote 1, page 12.

varies with the impact of the particular tax change on expected future taxes. This implies that, although β_5 is not a constant, the estimated value of β_5 will be negative.

The pre-Ricardian line of reasoning also suggests that an increase in transfer payments financed by a government deficit should have no effect on current consumption. The current transfer payment is analogous to a reduction in taxes. While households currently have more spendable income, they also have a new future tax liability. The pre-Ricardian equivalence view implies that these two effects should just balance to leave current consumption unchanged:¹ $\beta_6 = 0$. More generally, however, there are several reasons for expecting transfers to be a powerful fiscal stimulus. First, temporary transfers (e.g., unemployment insurance) and some permanent transfers (e.g., welfare payments and disability payments) are frequently given to individuals with binding liquidity constraints. Second, an increase in veterans benefits, social security or other permanent transfers is likely to be regarded by the recipients as a permanent increase in income. Third, an increase in the level of transfer payments will induce some individuals who are not currently eligible for benefits but who

¹Although it might be argued that transfer recipients are likely to have a higher marginal propensity to consume cash receipts than taxpayers in general, such an argument would be quite contrary to the character of the analysis supporting the pre-Ricardian equivalence hypothesis which implies that current consumption should not depend on current cash flow and that a redistribution of tax obligations among families should have no effect.

anticipate receiving benefits in the future to regard themselves as richer and therefore to increase their current consumption; this applies to all types of social insurance benefits that have replaced private saving "for a rainy day." All of this suggests that β_6 is positive and may be quite substantial.

I have argued elsewhere that the anticipation of social security retirement benefits causes individuals to reduce their own saving for retirement and therefore, ceteris paribus, to increase their consumption (Feldstein, 1974). To measure this effect, I have used a variable that I have called "social security wealth" and that I have constructed as the actuarial present value of the social security benefits for which the existing workforce and their dependents would become eligible when they reach age 65.¹ These previous studies with a more conventional specification of the consumption function imply that β_3 is positive and of the same order of magnitude as the coefficient of the conventional wealth variable (β_2).² In contrast to this view, Barro (1974, 1978) has

¹See Feldstein (1974) for a description of the construction of this variable. Although a more refined calculation has since been developed for use with microeconomic data (see Feldstein and Pellechio, 1979), the original method is still used to calculate the aggregate social security wealth values through 1974. Values for 1975-77 were obtained by extrapolating the 1974 ratio of SSW to GNP; although I plan to update the SSW series with the proper calculations, that calculation could not be completed in time for this study. Limiting the analysis to the years ending in 1974 leaves the results of the study essentially unchanged. The SSW series is presented in the appendix to this paper.

²For the most recent of these time series studies, see Feldstein (1979a). Microeconomic evidence in support of this conclusion is reviewed in Feldstein (1979b).

argued forcefully that the promise of future social security benefits should not decrease saving and increase current consumption because the taxes that will finance the social security benefits represent a household liability that, over the infinite future, is exactly as large as the benefits themselves. Since social security involves an explicit intergenerational transfer, the coefficient of SSW_t provides a clear test of the pre-Ricardian equivalence hypothesis. If $\beta_3 = 0$, current households save to compensate future generations completely for their extra tax burdens¹ while $\beta_3 > 0$ implies that increases in future social security benefits raise current consumption.

The final test is provided by including the value of the government debt itself. The pre-Ricardian equivalence view emphasizes that the public debt does not represent net wealth at all while the alternative "finite life" view is that the anticipation of future debt service obligations only partially offsets the value of the debt. Since the overall wealth variable (W_t) includes the value of the public debt, the pre-Ricardian hypothesis implies that a separate debt variable should have a coefficient that is negative but equal in magnitude to the coefficient of the total wealth variable; i.e., $\beta_7 = -\beta_2$. The alternative view is that households treat public debt as a net contribution to wealth so

¹Or households are so irrational that they ignore future social security benefits when deciding their current saving.

that even if $\beta_7 < 0$ it is also true that $\beta_7 + \beta_2 > 0$.¹

The focus on whether households regard the public debt as net wealth suggests another possible test. Inflation reduces the real value of public debt. If households regard public debt as net wealth, the product of the inflation rate (π_t) and the real value of the debt at the beginning of the year (D_t) represents an accrued real loss. Conversely, if households do not regard the debt as net wealth, the fall in the real value of the debt has no effect. Unfortunately, adding the variable $\pi_t D_t$ does not provide a clear-cut test for two quite different reasons. First, what matters is not merely the current rate of inflation but the expected future rate of inflation. Moreover, for Treasury bills and other debt with very short maturity, future changes in interest rates may compensate but for long-maturity debt future inflation will entail further losses. Second, and more important, variations in the anticipated rate of inflation affect real net wealth in several other ways because of the existing tax laws. In general, a higher rate of inflation raises the effective tax rate on the income of nonfinancial corporate capital, on all types of interest income, and, because of the progressive structure of the individual income tax, on personal income as a whole. At the same time, higher rates of inflation induce capital gains on assets like housing, land and gold. The coefficient of the $\pi_t D_t$ variable would reflect all of these missing variables that are correlated with π_t

¹An equivalent procedure defines W_t to exclude the value of government debt and tests whether the coefficient of a separate government debt variable is statistically different from the coefficient of W_t .

and would therefore not provide a useful test of the debt neutrality hypothesis.¹

In summary, therefore, the pre-Ricardian equivalence hypothesis implies that $\beta_3 = \beta_5 = \beta_6 = \beta_2 + \beta_7 = 0$. In contrast, the more general fiscal expectations view implies that $\beta_3 > 0$, $\beta_5 < 0$, $\beta_6 > 0$ and $\beta_2 - \beta_7 > 0$. The impotence of government spending implies further that $\beta_4 = -1$. The next section presents the estimated parameter values.

¹These comments do suggest important ways in which anticipated inflation may affect consumption and saving. These deserve further analysis if we are to understand the full impact of inflation on the economy.

3. The Parameter Estimates

The most serious problem in the estimation of equation 1 is the endogeneity of the key tax variable. An exogenous increase in consumer spending tends to boost aggregate demand in a way that raises nearly all types of tax collections, particularly sales taxes and profits taxes but also progressive personal taxes. This introduces a positive correlation between taxes and consumer spending that biases the coefficient of the tax variable toward zero and therefore in favor of the fiscal impotence and pre-Ricardian hypotheses. This bias is reinforced to the extent that discretionary changes in taxes have been used to offset fluctuations in consumer demand.¹ Because of the bias introduced in this way, previous estimates² have provided spurious support for the pre-Ricardian hypothesis and for the view that fiscal policy is impotent.

Although the bias cannot be fully eliminated, it can be reduced by instrumental variable estimation. The coefficient of the tax variable ($\hat{\beta}_5$) obtained in this way is substantially larger than the more seriously biased ordinary least squares estimate. Other estimated specifications described below also indicate the importance of the bias in the previous estimates of the effect of

¹The importance of the positive correlation between taxes and consumer expenditure is indicated by a regression of real per capita tax receipts on real per capita national income and real per capita consumption. The coefficient of the consumption variable is 0.70 (with a standard error of 0.09) while the coefficient of the income variable is only 0.06 (with a standard error of 0.06). The estimate refers to the same sample period as the other equations reported in this section.

²Including Buitert and Tobin (1978), Kochin (1974) and Tanner (1979).

tax changes.¹

Before turning to the instrumental variable estimates, it is useful to look briefly at the ordinary least squares estimates presented in equation 1.1 of Table 1. Note first that the coefficient of the tax variable is small and less than its standard error, a result that is consistent with the pre-Ricardian equivalence hypothesis. The estimated coefficient of the debt variable is negative and the sum $\beta_2 + \beta_7$ is not significantly different from zero; this lends further support to the pre-Ricardian view. However, the very large and clearly significant coefficient on government transfers is in sharp conflict with the assumption of fiscal neutrality. Similarly, the coefficient of the social security wealth variable does not support the pre-Ricardian hypothesis. The results of the OLS estimation are therefore mixed and give no clear-cut answer about debt equivalence in general although they suggest that current transfers and the promise of future transfers does raise consumer spending. Finally this evidence strongly contradicts the view that variations in government spending induce equal offsetting changes in private consumption; the point estimate indicates that only 11 percent of the variation in government spending is offset by changes in personal consumption.

¹It can of course be argued that several other variables in the equation are also endogenous. Although this might in principle be dealt with by enlarging the instrument set, there are too few instruments to yield useful estimates. Equations with additional variables treated as endogenous had unstable parameter estimates with large standard errors. For example, when income is treated as endogenous the coefficient of the tax variable is -0.317 but its standard error is 0.512; other coefficients and their standard errors are: for SSW, 0.021 (s.e.=0.021), for G, -0.02 (s.e.=0.22), for TRANS, 1.32 (s.e.=0.30).

Table 1

Fiscal Effects on Aggregate Consumer Expenditure

Equation	const.	Y	Y-1	W	SSW	G	T	TR	D	π^*D	RU*Y	T ₋₁	RE	Estimation Method	ScR
	(β_0)	(β_{10})	(β_{11})	(β_2)	(β_3)	(β_4)	(β_5)	(β_6)	(β_7)	(β_8)	(β_9)	(β_{10})	(β_{11})		DMS
1.1	.652 (.053)	.462 (.032)	.022 (.020)	.017 (.006)	.013 (.009)	-.109 (.057)	-.076 (.083)	1.185 (0.083)	-.011 (.011)					OLS	.0168 1.49
1.2	.566 (.101)	.489 (.047)	.004 (.030)	.028 (.012)	.030 (.020)	.063 (.169)	-.464 (.359)	1.361 (0.189)	.015 (.027)					IV	.0215 1.36
1.3	.605 (.056)	.495 (.045)	.010 (.023)	.022 (.005)	.024 (.012)	-.006 (.069)	-.337 (.168)	1.301 (0.111)						IV	0.1901 1.32
1.4	.703 (.136)	.477 (.039)	-.014 (.045)	.023 (.005)	.033 (.021)	.033 (.111)	-.391 (.232)	1.423 (0.247)			-.174 (.244)			IV	.0198 1.34
1.5	.616 (.106)	.492 (.059)	.010 (.022)	.021 (.095)	.024 (.012)	-.025 (.185)	-.304 (.370)	1.290 (0.163)		-.029 (.220)				IV	.0187 1.52
1.6	.722 (.135)	.462 (.044)	-.024 (.064)	.025 (.017)	.039 (.033)	.045 (.313)	-.414 (.582)	1.465 (0.441)	.011 (.024)	-.068 (.149)	-.212 (.351)			IV	.0207 1.49
1.7	.525 (.104)	.588 (.118)	-.019 (.040)	.022 (.005)	.024 (.013)	-.012 (.075)	-.416 (.241)	1.243 (0.110)					-.259 (.231)	IV	.0212 1.31
1.8	.604 (.062)	.496 (.043)	.010 (.025)	.022 (.006)	.024 (.014)		-.345 (.131)	1.306 (0.101)						IV	0.0218 1.27
1.9	.639 (.047)	.424 (.030)	.053 (.027)	.019 (.004)	.017 (.009)	-.051 (.046)	-.046 (.080)	1.239 (0.080)				-.128 (.072)		OLS	.0163 1.35

The dependent variable in each equation is real per capita consumer expenditure in thousands of 1972 dollars. All other variables are also stated as real per capita amounts. Estimates relate to the period 1930-77 with the years 1941-46 omitted. Estimated standard errors are shown in parentheses.

The same specification is repeated in equation 1.2 but with the tax variable treated as endogenous. An ideal instrumental variable would be highly correlated with the systematic component of the tax variable but uncorrelated with the concurrent disturbance in the consumption equation. The instrument that I have used is the lagged value of the tax variable itself; this achieves the desired high correlation with the systematic component of the tax variable but, because cyclical conditions last more than one year, is not completely uncorrelated with the consumption disturbance in the subsequent year. This use of instrumental variables may therefore reduce but not fully eliminate the bias caused by the endogeneity of the tax receipts.¹

The instrumental variable estimates suggest that the pre-Ricardian hypothesis fails each of the four tests described in the previous section. The coefficient of the tax variable is now a very sizeable $-.464$. The standard error of 0.359 reflects the difficulty of achieving a precise estimate with the instrumental variable estimator. The comparison of the coefficient and its standard error indicates that the null hypothesis that $\beta_5 \geq 0$ can be rejected at approximately the 10 percent level. The coefficient

¹Other instrumental variables might achieve a greater reduction in bias but they are also likely to increase the mean square error of the estimate because they are less strongly correlated with the systematic components of the tax variable. However, adding the variable G_{t-1} to the instrument set left the coefficients essentially unchanged.

of the debt variable is now positive and lends no support to the hypothesis that $\beta_7 = -\beta_2$.¹ The coefficient of the transfers variable remains approximately equal to one ($\beta_6 = 1.361$ with a standard error of 0.189) implying a very powerful fiscal effect of changes in the level of transfers. Finally, the coefficient of the social security wealth variable is now larger and approximately equal to the coefficient of ordinary fungible wealth. Thus all four tests favor the more general fiscal expectation approach over the fiscal neutrality conclusion of the pre-Ricardian hypothesis. The coefficient of the government spending variable indicates no ex ante crowding out of government spending.

Since the government debt variable is completely insignificant and has the wrong sign, it is omitted in equation 1.3.² The coefficients of the remaining variables do not change substantially but the reduced collinearity lowers the estimated standard errors. Note in particular that the coefficient of the tax variable (-.337) is now twice its standard error. The coefficient of the social security wealth variable (.024) is almost identical to the coefficient of the ordinary wealth variable and is also twice its standard error.³ These coefficients imply that each of the implications

¹This can be seen also by the alternative procedure of defining wealth to exclude the government debt. The coefficient of this net private wealth variable is 0.025 (with a standard error of 0.009) while the coefficient of the government debt variable is actually larger, 0.035 with a standard error of 0.30. A similar result was also obtained in the simpler specification of Yawitz and Meyer (1976).

²Recall that government debt is part of real wealth and therefore remains in the equation in that form.

³The coefficient of the SSW variable is approximately the same as the coefficient that I obtained in earlier studies with a somewhat different equation specification.

of the pre-Ricardian view can be rejected at conventional levels of significance; it is obviously very much more significant that all four tests should point simultaneously to rejection of the debt equivalence view.

In an earlier study of the effect of social security wealth (Feldstein, 1974), I found that adding the unemployment rate as an additional variable to adjust for cyclical fluctuations in permanent income had the effect of reducing the coefficient of the SSW variable to less than its standard error. Although the unemployment variable was itself statistically insignificant, this finding caused some commentators to doubt the conclusion that the promise of social security benefits reduces saving. In subsequent research with the improved data that became available after the national income accounts were revised, I found that adding the unemployment variable no longer mattered and that the unemployment variable itself remained statistically insignificant (Feldstein, 1979a). To test whether this remains true with the current specification and sample period, equation 1.4 has been estimated with the product of the unemployment rate and the level of national income.¹ It is clear that the coefficient of the unemployment variable is less than its standard error and that the other coefficients remain essentially unchanged.²

¹This specification, which was adopted in earlier studies (Barro, 1978; Feldstein, 1978), allows the impact of changes in the unemployment rate to vary with per capita income.

²I have also examined the effect of including this unemployment variable in combination with the debt variable. Neither of them is then significant.

Equation 1.5 shows that the accruing losses on real government debt do not have a significant effect on concurrent consumer spending and that the presence of this variable does not alter the coefficients of the other variables. Equation 1.6 combines all three of the variables that have been included separately but found to be insignificant. All three coefficients remain less than their standard errors. Although the greater collinearity raises the standard errors of the other coefficients, their estimated values remain essentially unchanged.

Equation 1.7 examines whether there is the same propensity to consume corporate retained earnings (RE) as other forms of national income. The coefficient of the RE variable is negative, suggesting that a higher level of retained earnings raises aggregate savings. However, since the coefficient is only as large as its standard error, the hypothesis that consumption is not affected by the distribution of corporate profits between dividends and retained earnings cannot be rejected.¹

Since the government spending variable has been insignificant in each of the specifications, I have reestimated the equation with this variable omitted. The remaining coefficients, presented as equation 1.8, show little change from the earlier specifications. The only change worth noting is that the standard error of the tax

¹This result supports an earlier finding reported in Feldstein (1973).

coefficient is now even smaller, implying a t-statistic of 2.6.

At an earlier stage in this study, I estimated equations containing lagged values of the fiscal variables. These equations, estimated by ordinary least squares, provide further evidence of the bias that results from the dependence of the tax variable on concurrent exogenous disturbances in consumer spending. Equation 1.9 presents one such specification in which the lagged tax variable and current tax variable are both included. Although both coefficients are significant, the coefficient of the lagged variable is much larger and more nearly statistically significant. Dropping the current tax variable leaves the other coefficients essentially unchanged but raises the coefficient on the lagged tax variable to -0.148 with a standard error of only 0.062 . Although a lagged tax variable would be expected to understate the true effect of a tax change, it does indicate that there is a statistically significant relationship that is masked when only the concurrent variable is used.

In a further attempt to explore the importance of the simultaneity bias, I disaggregated the tax variable into five separate components: federal personal taxes, federal nonpersonal taxes, state and local sales taxes, property taxes, and other state and local taxes. Unfortunately the collinearity among these variables is too great to distinguish separate coefficients; the problem is exacerbated by instrumental variable estimation. However, it is worth noting that, in an OLS equation with current and lagged fiscal

variables, the coefficients of three out of the five concurrent tax variables are positive while four of the five lagged variable coefficients are negative and more statistically significant.

4. Conclusion

The evidence presented in this paper indicates that changes in government spending can have substantial effects on aggregate demand. Although monetary feedbacks may limit the net effect on output of any fiscal stimulus, there is no indication of ex ante crowding out through consumers' reactions to government debt. Indeed, each of the basic implications of the pre-Ricardian equivalence hypothesis is contradicted by the data.

As I noted earlier in the paper, the analysis here has used the same basic specification as Barro, Kochin and Tanner but has dropped some of the restrictions that they had imposed. Rejecting their conclusion in this extension of their own framework implies that their parameter estimates can no longer be used to argue that the data support the pre-Ricardian hypothesis.

The results are instead consistent with a more general view of the effects of fiscal actions and fiscal expectations that is developed in the paper. A key feature of this view is that consumers interpret current changes in tax rates or in government spending as signals of possible future changes. More formally, they respond to any fiscal change by altering their subjective probability distributions of the taxes that they will pay and the benefits that they will receive for the rest of their lives. The distinction between "temporary" and "permanent" tax changes is an extreme and oversimplified version of this more general "fiscal expectations" view. The response to a fiscal change therefore cannot in general be calculated by classifying it as temporary or

permanent and applying a corresponding propensity to spend.

My emphasis here has been on the impact of discretionary fiscal changes. There are of course some economists who will wish to ask a different, hypothetical question: "If the government eliminated discretionary fiscal policy and adopted a set of fiscal rules that dealt with all contingencies and lasted forever, would there then be complete *ex ante* crowding out?" While I frankly do not find that question very interesting, two things about the answer are clear. First, except for unanticipated fluctuations in the economy that trigger changes in the fiscal variables, the individual knows his lifetime tax payments, transfer receipts and benefits of government spending. If there are no liquidity constraints, the individual's consumption will depend only on the present value of all fiscal actions and not on the particular changes in fiscal variables as they occur. Second, the actual uncertainty about future economic fluctuations implies that the future values of the fiscal variables are also uncertain. The individual will react to a change in his expectations about aggregate economic fluctuations on the basis of both the direct effect of these fluctuations on his income and also the indirect effect through changes in his tax rate and other fiscal variables. His response to any change in his expectation about the economy will therefore depend on the full set of fiscal rules. For example, if a rise in unemployment causes a substantial reduction in tax rates, the individual will respond to an expected increase in unemployment by raising his current spending above what it would

be with a different fiscal rule. In this sense, fiscal rules affect aggregate demand. The parameter estimates based on the very different regime of discretionary fiscal policy in which we actually live do not provide a complete basis for testing how the economy would behave under a regime of strict fiscal rules. It is clear however that none of the estimated parameters are inconsistent with the effectiveness of fiscal rules. In particular, the significant coefficient of social security wealth and the similarity of the effects of government debt and other wealth both support the potential effectiveness of fiscal policy.

The fact that fiscal policies are potentially powerful does not mean that they are useful tools for short-term demand management. The important and complex role of fiscal expectations that I have emphasized in this paper implies that the estimated coefficients indicate only the average responses for the 42 year sample period. The reaction to any particular fiscal change may differ substantially from these averages, depending on the fiscal expectations created by the circumstances of the change. The overall economic response to any fiscal policy is further complicated by its monetary and portfolio consequences.

We therefore do not have, and may never be able to have, enough precise information to be confident that discretionary fiscal policies can reduce the average amplitude of the short-run business cycle. This implies that the appropriate role of fiscal policy is much more modest than the task that it has been assigned in recent years. The extent of our ignorance and the potentially

powerful effects of fiscal changes imply that the magnitude of discretionary fiscal changes should be very limited. More substantial changes in fiscal policies should in general be limited to situations in which a sustained change in aggregate demand is sought and precise timing is unimportant.

AppendixFungible Wealth and Social Security Wealth

	Fungible Wealth (\$ billion)	Social Security Wealth (\$ billion)
1930	422.222	0.000
1931	364.613	0.000
1932	303.591	0.000
1933	289.963	0.000
1934	308.471	0.000
1935	320.323	0.000
1936	345.176	0.000
1937	358.438	48.547
1938	339.752	42.718
1939	349.899	70.163
1940	377.453	79.125
1941	404.993	111.183
1942	N.A.	156.746
1943	N.A.	178.920
1944	N.A.	187.897
1945	N.A.	192.940
1946	661.754	216.367
1947	729.608	228.307
1948	803.533	252.947
1949	841.396	240.123
1950	887.548	271.163
1951	975.327	354.106
1952	1,001.362	379.385
1953	1,042.000	407.121
1954	1,079.000	406.468
1955	1,176.000	473.989
1956	1,282.000	519.742
1957	1,349.000	581.428
1958	1,400.000	605.800
1959	1,437.000	664.294
1960	1,665.000	701.943
1961	1,724.000	743.343
1962	1,861.000	835.286
1963	1,879.000	897.745
1964	2,043.000	1,009.989
1965	2,202.000	1,130.055
1966	2,354.000	1,277.919
1967	2,341.000	1,405.433
1968	2,584.000	1,562.900
1969	2,883.000	1,727.078
1970	2,956.000	1,910.865
1971	3,118.000	2,090.231
1972	3,376.000	2,331.300
1973	3,841.000	2,732.661
1974	4,124.000	3,057.636
1975	4,248.000	3,246.095
1976	4,864.000	3,638.051
1977	5,381.000	4,082.192

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