Ricardo or Keynes: Does the Government Debt Affect Consumption?

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This paper examines the hypothesis that although household consumption is affected by the share of the national income that is spent by government, it does not depend on whether government obtains command of its share by taxation or by borrowing. Estimates of annual consumption functions using alternative measures of income and wealth that differ in their treatment of government spending, borrowing, and debt, do not in general support this hypothesis. Changes in government tax revenues have a stronger influence on consumption than changes in government spending. However, there is some support for the hypothesis that increases in government debt do not stimulate consumption spending, suggesting that households recognize that debt interest payments must be financed out of future taxes.

In the last five years, as tax rates have been lowered with no corresponding reduction in federal outlays, the budget deficit of the federal government has increased sharply. By most conventional measures, fiscal policy has been strongly expansionary over this period. Since the tax reductions added to households' disposable incomes, they presumably enabled households to spend more on consumption, causing aggregate demand to be stronger than otherwise. However, this presumption that a policy of lowering taxes is stimulative rests on the assumption that consumers determine their levels of spending on the basis of their current after-tax incomes and do not take account of the huge increase in the amount of outstanding federal debt that results from the tax reduction.

In recent years, several economists have argued that households realize that the existence of government debt means that taxes will be higher in the future, and that they take account of this future tax liability when making their current saving and consumption decisions. This argument implies that tax cuts that are not accompanied by equal reductions in government outlays will not affect consumption, because households will view the tax cuts as necessarily temporary; taxes will have to be higher in the future to service the higher level of government debt. From this view, recent fiscal policy may not have been particularly expansionary despite the existence of unprecedented federal deficits.

This paper seeks to throw light on the interaction of government deficit spending and household consumption using newly available data on the assets and liabilities of the private and government sectors of the economy. These balance sheet data, assembled by the Federal Reserve as a supplement to the Flow of Funds Accounts, show how the savings of each sector of the economy are translated into changes in their net wealth. Using these data in conjunction with the flow of funds and national income accounts, it is possible to construct alternative measures of private income and wealth that differ in their treatment of government borrowing and debt. The paper uses these alternative measures to estimate equations to explain household con-

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sumption, with a view to discovering whether changes in government borrowing and debt affect household spending decisions.

The first section of the paper reviews the theory of household consumption behavior with particular emphasis on the role of the government debt. The argument that households recognize that additional government borrowing today will require higher taxes in the future, and that they take this into account when making their consumption and saving decisions, is described as the "Ricardian" view, after the nineteenth century English economist, David Ricardo. The alternative view, that households largely ignore the future tax burden implied by the existence of an outstanding federal debt, is described as the Keynesian hypothesis.[1] The second section of the paper derives the estimating equations that permit an empirical comparison between these alternative theories, and describes the statistical data used. The empirical results are presented in the third section. The fourth section provides a brief summary and suggests some conclusions.

I. Theory

Until about ten years ago, it was an article of faith among most economists that governments could influence the aggregate demand for goods and services in the economy by altering either their expenditures or their tax revenues. Increased government outlays were presumed to contribute directly to aggregate demand, while lower taxes — by adding to the disposable income of the private sector — were thought to stimulate private demand indirectly. This view of the effects of fiscal changes underlay the major Kennedy-Johnson tax cut of 1964, the ten-percent surcharge on personal taxes applied in 1968, and the series of smaller tax changes in the early 1970s — all of which were designed specifically to offset cyclical fluctuations in the economy.

Keynesian Approach

The view that aggregate demand may be "managed" through fiscal policy, usually identified with Keynesian economics, rested on the assumption that the method by which government spending is financed — by levying taxes or by borrowing in the financial markets[2] — is important in determining its impact on aggregate demand. Increasing government spending without raising taxes, or reducing tax revenues without cutting expenditures both were assumed to stimulate total demand, whereas equal changes in expenditure and taxes were thought to have much smaller effects.[3] In effect, this Keynesian approach to fiscal policy held that an increase in the amount of the government's expenditures financed by borrowing — "deficit financing" — rather than by levying taxes — "tax financing" — would significantly stimulate aggregate demand.

Ricardian Challenge

In recent years, a number of economists[4] have challenged this argument and, as a result, cast doubt upon whether changes in fiscal policy have any significant influence on aggregate demand.[5] These economists argue that the method by which government expenditures are financed is not relevant to their effect on aggregate demand. Their argument derives from the assertion that *eventually* all government outlays must be paid for out of tax revenues.

Suppose, they say, that the government cuts taxes in a given year but leaves its expenditures — except payments of interest and principal on the government debt — unchanged both in that year and *in all future years*. To pay its bills, the government must borrow by issuing government bonds to the private sector. However, by issuing more debt, the government puts itself in a position wherein it must raise taxes sometime in the future to meet the resulting higher payments of interest on the debt. For this reason, the government cannot reduce taxes *permanently* while maintaining its outlays on goods and services unchanged.

The government might attempt to avoid increasing taxes by financing higher future interest payments by additional borrowing. In such a case, the government's debt would rise at the same rate as the interest rate that it pays, even if the government were to meet all of its other expenditures (both current and future) fully out of tax revenues. Such a policy cannot be sustained in the long run if the interest rate exceeds the growth rate of GNP, because the interest payments on the debt will grow faster than (and eventually will consume the whole of) GNP. Even if

the interest rate were less than the economy's growth rate, the debt might still grow faster than GNP if the noninterest portion of the budget were to remain in deficit.

Alternatively, the government might seek to avoid raising taxes by financing future deficits through the creation of new money and thereby cause inflation. Although this financing method avoids higher *explicit* taxes, it imposes what is in effect an "inflation tax" on those groups in the society that are unable to protect themselves against the effects of rising prices.

The inevitable conclusion of both financing alternatives is that a reduction in current taxes must be repaid by higher taxes sometime in the future.[6] Thus, in present value terms, tax changes do not alter the liability of the private sector to pay taxes to the government; they only affect the *timing* of those payments, with tax cuts delaying them into the future and tax increases hastening them into the present.

This line of argument implies that tax changes will have no effect on the aggregate demand for goods and services when *two* conditions are satisfied. First, private spenders should recognize that such changes alter only the timing of tax payments and not their eventual amount and, second, they should be able and willing to offset such alterations in timing by appropriate amounts of borrowing or lending. The modern theory of consumer behavior argues that these conditions do indeed hold.

Consumption Theory

Since Milton Friedman developed the permanent income hypothesis of consumption and Modigliani and Brumberg the life-cycle approach in the mid-1950s, most economists have accepted the notion that households plan their consumption (in broad outline although not, of course, in detail) over a relatively long time horizon. The typical household seeks to "smooth out" over its life-cycle the effects on its living standards of variations in its income. The household does this by borrowing during periods when its current income is low, saving and repaying debt during its prime earning years, and living off its accumulated assets during retirement. Thus, a household's consumption in any given year depends on its estimate of the total resources it will have over its complete life-cycle, and thus may not be closely related to the household's income in that particular year.

The assertion that tax changes that do not reflect changes in present or future government outlays should have no net effect on private expenditures is a logical extension of this life-cycle argument. Consider, for example, a typical household faced with a tax increase after it has mapped out a long-term plan for consumption. In formulating its plan, the household will have taken account of its best estimates of future income and tax payments. The plan will be "optimal" in the sense that no further changes in consumption (in the form of reducing consumption in some years in order to increase it in other years) will add to the household's lifetime welfare.

Under such circumstances, a tax change that increases the household's *current* tax payments but lowers *future* payments by an equivalent amount will not cause it to alter its consumption plan because it has no effect on the household's ability to finance any particular consumption plan. The additional current taxes can be paid by borrowing and the lower future taxes will provide the funds needed to repay this loan. Since the original consumption plan was optimal and is still possible, the household has no reason to change it.

Ricardian Equivalence

Thus, the proposition that tax changes have no effect on household consumption plans follows directly from the modern life-cycle theory of consumption behavior. In fact, the proposition has a much longer history and originally was put forward by David Ricardo more than a hundred and fifty years ago.[7] For this reason, the modern proponents of this argument describe it as the *Ricardian equivalence theorem*.

Ricardian equivalence also implies that a household will reduce its current consumption if government spending increases today or is expected to increase in the future, *even if there is no change in current taxes*. The household will cut current consumption because it recognizes that additional government outlays *must* be financed eventually by higher taxes, and hence that its after-tax income will be reduced in the long run.

Two principal arguments have been advanced against the Ricardian approach.[8] The first is that households are myopic; they do not foresee the

higher taxes necessitated in the future when current taxes are lowered without a change in the government's current and prospective non-interest expenditures. Put somewhat differently, myopia means that, in estimating the resources they have available for consumption, households regard their holdings of government securities as part of their wealth, and the interest on those securities as part of their income, but ignore their corresponding liability as taxpayers to finance the payments of interest and principal on the securities.[9]

Economists describe this myopia as "fiscal illusion". Households suffering from fiscal illusion will regard a current tax cut as adding to their resources available for consumption, and ignore the higher taxes that will subtract from those resources in the future. Interestingly, Ricardo himself appears to have taken this view. While proposing Ricardian equivalence as a theoretical possibility, he argued that, in practice, households put more weight on current tax changes than future ones.[10] In particular, Ricardo proposed that wars should be financed by current taxes rather than by borrowing, since placing the full tax burden on the present generation would dissuade governments from engaging in war.[11]

A particular case of this argument is the situation where the higher future taxes will not fall on the present generation of households (those who receive the tax cut) but on their descendants. In this case, Ricardian equivalence implies that members of the present generation will add to their bequests in order to offset the higher taxes that will fall on their children. Critics (including, as we have seen, Ricardo himself) suggest that households either are not this farsighted or do not care enough about (possibly unborn) future generations to provide them with larger bequests to offset those generations' taxes.

A second argument against the Ricardian equivalence hypothesis is that households may be unable to offset the effects of a tax increase because their ability to borrow is limited. For example, a household faced with higher current taxes may wish to borrow in order to avoid a cut in its current consumption but be unable to do so because no lender is willing to make the loan. As a result, a tax increase may compel the household to reduce its consumption even though it recognizes that its taxes will be lower in the future. Conversely, a household that already is constrained by its ability to borrow — and so is consuming less than it would if it were free to borrow more — may take advantage of a tax cut to add to its current consumption even though it recognizes that its tax payments will be higher later.[12]

Formal Models

The Keynesian and Ricardian models of consumption behavior agree that households' consumption and saving decisions depend on the levels of their income[13] and wealth, but differ in the concepts of income and wealth to which the typical household pays attention.

In the traditional Keynesian approach, consumption is made to depend on income *after taxes*, while wealth is defined to include the value of households' holdings of government securities, without subtracting the capitalized value of the future taxes needed to service those securities. Thus, under the Keynesian approach:

$$C = a + bY^K + cW^K \qquad (1)$$

where

$$Y^K = Y - T \qquad (1a)$$

$$W^K = K + D \qquad (1b)$$

In equation 1a, Y represents national income and T is net payments of taxes to government;[14] the income of the private sector, Y^K, is income minus taxes. In equation 1b, K represents the stock of tangible and equity capital owned by the private sector at the beginning of the year, and D represents the stock of privately held government debt outstanding.[15]

In contrast, the Ricardian approach implies that income should be defined as national income *less government expenditures on goods and services*[16] since this difference represents the portion of the national product that is available to the private sector for consumption. Ricardian equivalence means that the method (taxation or borrowing) by which the government obtains command over the share of the national income that *government* spends does not affect the amount of *their* share that *households* spend. The Ricardian approach also implies that the definition of private wealth should not

include the private sector's holdings of government securities since these are precisely offset by households' liability to pay future taxes. Thus, under the Ricardian approach:

$$C = a' + b'Y^R + c'W^R \quad (2)$$

where $$Y^R = Y - G \quad (2a)$$

$$W^R = K \quad (2b)$$

In equation 2, the income variable, Y^R, is defined as national income less government spending on goods and services, excluding government spending on transfer and interest payments, and wealth, W^R, excludes the private sector's holdings of government securities.

In conducting empirical tests of these alternative models of household behavior, it is important to choose definitions of income and wealth that treat the government's taxing and borrowing activities in the same way. If, for example, households regard their holdings of government debt as part of their wealth (the Keynesian view), then they also should regard taxes but not government borrowings as reductions from their income. In contrast, if households were to take the Ricardian view that all government expenditures represent claims against their incomes (whether these expenditures are financed by taxes or by borrowing), then they should not regard their holdings of government bonds as part of their wealth.

The definitions of income and wealth in the preceding equations are consistent in this sense. This consistency implies that, for either pair of definitions, private disposable income less consumption (that is, saving) during a year is equal to the annual change in private wealth.[17] To see this, recall that the national income is equal to the sum of consumption, investment and government expenditures on goods and services,

$$Y = C + I + G \quad (3)$$

Also, investment is equal to the change in the stock of tangible assets in the economy, and the government deficit is equal to the change in the stock of government debt outstanding,

$$I = \Delta K \quad (4)$$

$$G - T = \Delta D \quad (5)$$

In the Keynesian case, the private sector's disposable income is equal to national income less the taxes the private sector pays to the government. Hence,

$$\begin{aligned} Y^K - C &= (Y - T) - C = I + (G - T) \\ &= \Delta K + \Delta D \\ &= \Delta W^K \end{aligned} \quad (6)$$

where ΔW^K represents the change in Keynesian wealth over the year.

In the Ricardian case, by contrast, private disposable income is defined as the national income less government expenditures. Hence,

$$\begin{aligned} Y^R - C &= (Y - G) - C = I \\ &= \Delta K \\ &= \Delta W^R \end{aligned} \quad (7)$$

where ΔW^R represents the change in 'Ricardian' wealth over the year.

II. The Empirical Model

The approach used in this paper to test whether the Keynesian or the Ricardian approach to the role of government better explains average household consumption behavior is to estimate a series of annual consumption functions that use as explanatory variables different measure of real, or inflation-adjusted, income and wealth. The measures differ in the way in which government taxes, expenditure, and debt are treated.

To ensure that the definitions of income and wealth are consistent among the equations, they are made to satisfy accounting identities of the type illustrated in equations 6 and 7 in the preceding section. Consumption is defined as real personal consumption expenditures (in constant 1982 prices) on nondurable goods and services. Purchases of durable consumption goods are regarded as part of gross saving, and the stock of household durables as part of gross wealth. These definitions are used in the Federal Reserve's Flow of Funds Accounts and National Balance Sheets.

Income and Wealth

In the theoretical discussion of the previous section, it was assumed that consumption during a given year depends on the level of private wealth at the beginning of the year, and that the change in wealth from the beginning of one year to the beginning of the next is equal to gross private saving during the year. In reality, there are three other factors that contribute to the year-to-year change in the real value of private wealth. They[18] are (i) physical depreciation of tangible assets, (ii) changes in the values of assets due to changes in asset prices, and (iii) changes in the real value of wealth as a result of inflation in the prices of consumer goods.

These factors also should influence households' consumption decisions. If the real value of their wealth is reduced during the year by the physical depreciation of their stocks of tangible assets or as a result of increases in the prices of consumer goods, households are likely to want to save more and consume less. In contrast, if increases in asset prices were to add to the market values of their wealth over the year, households would be likely to want to consume more and save less. These considerations suggest that consumption should depend on the level of wealth, after accounting for changes caused by the three factors named. Equations 1 and 2 therefore should be modified to yield estimating equations of the general form:

$$C_t = a + bY_t + c[W_t - Dep_t + Rev_t - Inf_t] \quad (8)$$

where Y_t = Real gross private sector income in year t

W_t = Real gross private wealth at the beginning of year t

Dep_t = Depreciation of tangible assets in year t

Rev_t = Asset revaluations due to changes in asset prices during year t

Inf_t = Decrease in real value of wealth due to inflation during year t.

The definitions of income, Y_t, and wealth, W_t, in this equation will be different between the Keynesian and Ricardian cases. The differences in the definition of wealth in turn will imply different definitions of the inflation variable. In the Keynesian case, the inflation variable, Inf_t, will include the change in the real value of the government debt due to inflation;[19] in the Ricardian case, it will not.

Equation 8 assumes that all changes in real wealth have the same effects on household consumption. In particular, differences in the level of wealth at the beginning of the year, W_t, have the same impact on consumption as do changes in real wealth during the year due to depreciation, changes in asset prices, and general inflation (Dep_t, Rev_t, and Inf_t). Clearly, this is a very strong assumption.

Influence of Depreciation

Most studies of the consumption function take for granted that consumption decisions are made on the basis of *income net of depreciation* rather than gross income. Implicitly, this amounts to assuming that

households regard the making good of depreciation on their tangible assets as having some sort of prior claim on their current gross income before it is used for consumption. Equation 8 represents an alternative hypothesis that although households recognize that physical depreciation of their homes and stocks of consumer durables reduces their wealth (and so their lifetime consumption), they do not necessarily regard the making good of this depreciation as having a prior claim on their gross incomes in the year in which it actually occurs. On this hypothesis, consumption decisions are related to *wealth net of depreciation* rather than to income net of depreciation.

These alternative hypotheses may be tested by including gross income, gross wealth, and depreciation as *separate* explanatory variables in the equation. The coefficient on depreciation is expected to be negative. If consumption were related to *income* net of depreciation, the coefficients on the income and depreciation variables would be equal but of opposite signs. If *wealth* net of depreciation were the key variable, as equation 8 assumes, there would be equal and opposite-signed coefficients on the wealth and depreciation variables.

Asset Revaluations

Several studies have found that increases in the market value of household asset holdings tend to stimulate consumption expenditures.[20] In equation 8, such revaluations have the same impact on current consumption as do other changes in gross wealth. However, some changes in asset values may occur toward the end of a year and so have less effect on that year's consumption. Also, households may regard some revaluations as transitory (rather than permanent increases or decreases in their lifetime resources), and may not alter their consumption in response. For these reasons, the effect of the revaluation variable on consumption may be smaller than that of the wealth variable. To allow for this possibility, the equations estimated below include the revaluation variables, Rev_t, as a separate term.

Inflation

With regard to the effect of inflation, a number of economists in the Keynesian tradition have argued that only changes in the real, inflation-adjusted, value of the government debt should have an effect on household consumption.[21] Additions to the nominal debt (that is, budget deficits) that represent only the effect of inflation, should not influence private consumption behavior.[22] This argument means that reductions in the real value of the public debt due to inflation should reduce consumption in the Keynesian model. Such reductions should have no effect in the Ricardian model because inflation simultaneously reduces the real burden of the taxes required to service the debt.

Equation 8 permits a comparison of these hypotheses. In the Keynesian version of the equation, but not the Ricardian version, the "inflation loss" term, Inf_t, includes the effect of inflation on the real value of the government debt. However, as in the case of asset revaluations, the effect on consumption of inflation-induced losses of real wealth may be different (probably smaller) from the effect of other wealth changes. Hence, the estimated equations include a separate term representing inflation-caused losses of real wealth.

Interest Rate

In addition to the income and wealth variables, the estimated equations also include as an explanatory variable a measure of the real, inflation-adjusted, after-tax, short-term interest rate. That measure represents the terms on which households are able to substitute between current and future consumption. This real interest rate is constructed as a quarterly series and then aggregated into an annual rate.

The yield on six-month commercial paper is used as a measure of the pre-tax, nominal, short-term interest rate facing consumers. The after-tax rate is estimated by multiplying this yield by $(1 - Rtax)$, where Rtax is an estimate of the marginal tax rate paid by individuals.[23] The real yield in each quarter is derived by subtracting from the nominal yield a measure of the expected rate of inflation in the prices of consumer goods. The expected inflation rate in each quarter is proxied by the actual inflation rate over the five-quarter period centered in that quarter.[24]

Estimating Equations

These modifications to the simple theoretical model described in the last section yield an estimating equation of the form:

$$\begin{aligned} Ct &= a + b.Yt + c.W_t \\ &\quad + d.Dep_t + f.Rev_t \\ &\quad + g.Inf_t + h.R_t \end{aligned} \tag{9}$$

where R_t = real, after-tax, short-term interest rate

This equation represents a generalization of equation 8. Again, the definitions of Y_t, W_t and Inf_t will be different in the Keynesian and Ricardian cases. The coefficients on income and wealth are both expected to be positive. The coefficient on the revaluation variable (f in equation 9) is expected to be positive and of approximately the same order of magnitude as, or smaller than, that on the wealth variable. Similarly, the coefficient on the inflation-loss variable (g in equation 9) is expected to be negative, but again of approximately the same order of magnitude as, or smaller than, that on wealth.

Data for each of the variables (except the interest rate) were assembled using the recently revised National Income and Product Accounts constructed by the Department of Commerce and the corresponding Flow of Funds Accounts and National Balance Sheets[25] prepared by the Federal Reserve. The data used are annual series from 1953 to 1985. Care was taken to ensure that, with only very minor exceptions, the data[26] satisfied the condition that:

$$W_{t+1} - W_t = Y_t - C_t + Rev_t - Dep_t - Inf_t \tag{10}$$

All data are put on a per capita basis and are deflated by the implicit deflator for personal consumption expenditures on nondurable goods and services.

To allow for the possibility that private households may treat state and local governments differently from the federal government,[27] the income and wealth data were constructed for three alternate levels of consolidation. In each case, the revaluation and inflation-loss variables were defined so as to be consistent with the definitions of the corresponding income and wealth variables.[28]

In the first or Keynesian consumption equation, the income variable is defined as the portion of the gross national product received by the private (nongovernment) sector[29] after both federal and state and local government taxes and transfers. Similarly, the wealth variable[30] is defined to include the private sector's holdings of both federal and state and local government debt as well as of tangible and equity assets. Thus, equation 9 becomes

$$\begin{aligned} C_t &= a_0 + a_1.(GNP_t - T_t^F - T_t^{SLG}) \\ &\quad + a_2.(K_t + D_t^F + D_t^{SLG}) + \ldots . \end{aligned} \tag{11}$$

where T represents tax and nontax payments to each level of government, net of all government transfer and interest payments.

In the second equation, the private and state and local government sectors are consolidated. The income variable is defined as the portion of GNP accruing to the private *and* state and local government sectors less those governments' expenditures on goods and services whether financed by net taxes or borrowing. This income variable includes transfer payments received from the federal government (including grants-in-aid to state and local governments) and is net of all federal taxes. Payments and receipts of taxes and transfer payments between the private and state and local government sectors are netted out. Wealth is defined to exclude the private sector's holdings of state and local government debt but to include holdings of federal government debt. Thus,

$$\begin{aligned} C_t &= a_0 + a_1.(GNP_t - T_t^F - G_t^{SLG}) \\ &\quad + a_2.(K_t + D_t^F) + \ldots . \end{aligned} \tag{12}$$

This equation is a hybrid between the Keynesian and Ricardian approaches. Households are Ricardian with respect to local and state government taxes and debt, but Keynesian with respect to the federal government.

Finally, in the third equation, all tax and transfer payments (including inter-sector transfers between the federal and state and local governments) are netted out. Hence, the income variable represents the whole of GNP (except for the small portion that accrues to foreigners) less expenditures on goods and services by governments at all levels. Wealth consists only of the stocks of tangible capital, land,

and foreign assets less that portion that is owned directly or indirectly by foreigners. Thus,

$$C_t = a_0 + a_1 \cdot (GNP_t - G_t^F - G_t^{SLG}) + a_2 \cdot (K_t) + \ldots . \quad (13)$$

This equation is a fully Ricardian one, since wealth excludes the private sector's holdings of government debt whereas private income is defined by subtracting from GNP all government expenditures whether financed by taxes or borrowing.

III. Empirical Results

Table 1 reports the results of estimating consumption equations using the three alternative measures of income and wealth defined in equations 11, 12, and 13 in the preceding section. Each equation also includes the real after-tax interest rate and the revaluation and inflation variables; the last is defined to be consistent with the definitions of income and wealth.

In preliminary estimates of these equations, the coefficients on the depreciation variable (Dep_t in equation 9) were found to be positive and statistically significant. As explained above, theory predicts that these coefficients should be negative. Indeed, virtually all past estimates of consumption functions have simply assumed that consumption depends on income net of depreciation, and therefore have implicitly imposed the restriction that the coefficient on depreciation is equal but opposite in sign to that on gross income. Since the depreciation variable has a steady upward trend over the sample period, with little year-to-year variation, one possible explanation of its positive coefficient is that the depreciation variable is acting as a proxy for an upward trend in consumption caused by some omitted variable.

When an explicit trend variable[31] was added to the equation, the estimated coefficients on the depreciation variable were negative in all three equations. The hypothesis that consumption is related to wealth net of depreciation could not be rejected. Imposing this restriction yielded a better fit (lower standard errors of the equations) than the alternative restriction that consumption depends on income net of depreciation.

This result suggests, in contrast to the conventional assumption, that households treat depreciation of their tangible assets as reducing their *wealth* rather than current *income*. Hence the equations reported in Table 1 incorporate this restriction; that is, in them, wealth is defined *net* of depreciation.

In each equation in Table 1, both income and net wealth are found to have significant positive effects on consumption expenditures, regardless of the measure used. The coefficients on the revaluation variables also are positive, implying that households respond to increases in the market value of their net assets by adding to their consumption. The smaller coefficients on this variable compared to those on

TABLE 1

Consumption Equations Using Three Alternative Measures of Income and Wealth

Dependent Variable: Per Capita Consumption Expenditures on Nondurables and Services ($ 1982)

	Alternative Income/Wealth Variables		
Regressor	**Keynesian**	**Hybrid**	**Ricardian**
Constant	−0.306	−0.099	0.621
	(1.13)	(0.30)	(2.52)
Trend	0.306	0.289	0.553
	(4.55)	(3.63)	(9.52)
After-Tax Real Interest Rate	−0.009	−0.008)	−0.031
	(0.68)	(0.47)	(1.90)
Per Capita Real Income	0.339	0.328	0.183
	(6.65)	(5.68)	(3.50)
Per Capita Net Wealth	0.037	0.039	0.048
	(4.87)	(4.27)	(4.90)
Asset Revaluation	0.014	0.016	0.021
	(2.28)	(2.35)	(2.85)
Inflation Loss	−0.015	0.012	−0.058
	(1.002	(0.66)	(2.82)
SEE	0.063	0.072	0.082
R^2	0.997	0.995	0.993
Rho	0.244	0.302	0.360
	(1.20)	(1.52)	(1.85)

the wealth variable suggest either that households do not react to such revaluations within the year or that they treat a part of any addition to the market value of their assets in a given year as transitory. Reductions in the real value of wealth resulting from inflation are estimated to reduce consumption, although this negative effect is not statistically significant.

Inspection of the standard errors of the equations in Table 1 shows that the hybrid and Ricardian equations that consolidate the private and government sectors provide a less satisfactory fit to the data. Although the difference is not particularly large, it casts some doubt on the Ricardian approach since it suggests that households do not regard taxes and government borrowing as fully equivalent methods of financing government expenditures.

For a sharper test of this result, estimated equations that include the *differences* between the various alternative measures of income and wealth as additional explanatory variables are reported in Table 2. In these equations, private income is defined as the gross national product minus the net taxes that the private sector pays, and private wealth includes the stocks of both federal and state and local government debt outstanding. These are the same definitions of income and wealth used in the first equation in Table 1.

The first equation in Table 2 adds the differences between these income and wealth variables and the corresponding measures when the private and state and local government sectors are consolidated. In the case of income, the difference is equal to the current deficit of the state and local government sector; in the case of wealth, it is equal to the state and local government debt.[32] Thus,

$$C_t = a_0 + a_1.(GNP_t - T_t^{SLG} - T_t^F) + a_{11}.(G_t^{SLG} - T_t^{SLG}) + a_2.(K_t + D_t^F + D_t^{SLG}) + a_{22}.(D_t^{SLG}) + \ldots\ldots \quad (14)$$

If (as the Ricardian approach assumes) households treat state and local government expenditures as claims against their own incomes, regardless of how these outlays are financed, and if they do not regard their holdings of state and local government

TABLE 2

Consumption Equations including Differences between Alternative Measures of Income and Wealth

Dependent Variable	Per Capita Consumption Expenditures on Nondurables and Services ($ 1982)		
Regressor	**I**	**II**	**III**
Constant	0.671	0.687	0.669
	(2.092	(1.76)	(1.34)
After-Tax Real Interest Rate	0.043	0.019	0.024
	(2.34)	(1.44)	(1.68)
Per Capita Real Income	0.514	0.475	0.502
	(12.16)	(13.58)	(16.51)
Per Capita Net Wealth	0.027	0.033	0.027
	(2.15)	(3.48)	(3.21)
Asset Revaluation	0.026	0.014	0.014
	(2.09)	(1.58)	(1.38)
Inflation Loss	−0.033	−0.012	−0.012
	(0.85)	(0.17)	(0.16)
State/Local Govt Deficit	−0.126	—	
	(0.25)		
State/Local Govt Debt	−0.309	—	
	(1.52)		
Federal Deficit	—	0.277	
		(2.84)	
Federal Debt	—	−0.008	
		(0.19)	
Total Govt. Deficit	—	—	0.215
			(2.20)
Total Govt. Debt	—	—	−0.016
			(0.27)
Inflation Loss Adjustment	5.81	0.543	0.431
	(1.56)	(0.50)	(0.44)
Revaluation Adjustment	—	0.091	0.087
		(0.56)	(0.50)
SEE	0.085	0.075	0.078
R^2	0.995	0.997	0.996
Rho	0.148	0.226	0.256
	(0.92)	(1.04)	(1.19)

debt as part of their net worth because they imply a corresponding liability to pay future taxes, we would expect [33]

$$a_{11} = -a_1 < 0 \text{ and } a_{22} = -a_2 < 0.$$

In contrast, if households do not consolidate the spending and borrowing of state and local governments with their own (as the Keynesian model assumes), we would expect $a_{11} = a_{22} = 0$.

Unfortunately, the results in this first equation are inconclusive as neither of these pairs of hypotheses may be rejected at conventional probability levels. However, a_{22} is negative and significant at a 14 percent probability level, which would imply that increases in state and local government debt have a smaller wealth effect on household consumption than do increases in other forms of wealth. This provides some support for the Ricardian approach.

In the second equation in Table 2, the income and wealth variables are the same as in the first equation, but the *federal* deficit and *federal* debt are included as additional variables. Thus, this equation assumes that households do not consolidate the debt and income of state and local governments with their own, and allows us to examine whether they do consolidate those of the federal government. Thus,

$$\begin{aligned} C_t = a_0 &+ a_1.(GNP_t - T_t^{SLG} - T_t^F) \\ &+ a_{11}.(G_t^F - T_t^F) \\ &+ a_2.(K_t + D_t^{SLG} + D_t^F) \\ &+ a_{22}.(D_t^F) + \ldots . \end{aligned} \tag{15}$$

If households were to treat federal expenditures as reductions from their spendable incomes, regardless of whether these are financed by taxation or bond issuance, we would expect $a_{11} = -a_1 < 0$. Similarly, if they were to regard federal debt as involving a future tax burden and therefore not representing net wealth, we expect $a_{22} = -a_2 < 0$.

The first of these hypotheses is decisively rejected; in the second equation in Table 2, a_{11} is significantly positive rather than negative, implying that a decrease in federal taxes has a strong positive effect on consumption. The equation neither confirms nor rejects the second hypothesis, since although a_{22} is negative and not significantly different from $-a_2$, it also is not significantly different from zero.

Finally, in the third equation of Table 2, the implications of consolidating the state and local and federal governments are examined. This equation includes the combined deficit of the federal and state and local government sectors and the total government debt. Thus,

$$\begin{aligned} C_t = a_0 &+ a_1.(GNP_t - T_t^{SLG} - T_t^F) \\ &+ a_{11}.(G_t^{SLG} + G_t^F - T_t^{SLG} - T_t^F) \\ &+ a_2.(K_t + D_t^{SLG} + D_t^F) \\ &+ a_{22}.(D_t^{SLG} + D_t^F) + \ldots . \end{aligned} \tag{16}$$

As in the other equations, the Ricardian hypothesis implies[34] that $a_{11} = -a_1$ and $a_{22} = -a_2$.

In this equation, the coefficients on the wealth variable and on the stock of government debt (a_2 and a_{22}) are not significantly different in absolute value, as required by the Ricardian hypothesis. But since a_{22} also is not significantly different from zero, the first result is inconclusive. As in the second equation, a_{11} is positive and significant, implying that tax increases have a strongly negative effect on consumption.

The results in Table 1 with regard to the effects of asset revaluations and inflation on consumption decisions are not altered in Table 2. Additions to the nominal value of wealth resulting from increases in asset prices tend to encourage household consumption, whereas reductions in its real value due to inflation tend to discourage spending.

IV. Summary and Conclusions

This article has examined two views of the effect of government spending on household consumption. In what may be characterized as the Keynesian approach, households consider reductions in government taxes as additions to their income and wealth, and therefore, such tax changes have a stimulative effect on consumption. This approach also assumes that additions to government spending add directly to aggregate demand.

The Ricardian approach says that households would discount the stimulation of additional government spending or reduced taxes because they recognize that government expenditures reduce the spendable resources at their command regardless of how those expenditures are financed. When government spending is financed by current taxation, household income is reduced immediately. When it is financed by debt issuance, the need to extract taxes in the present is reduced but additional taxes will have to be levied in the future to finance the payment of interest and principal.

Thus, the Ricardian approach suggests that recent tax reductions would have little permanent effect on household spending since they do not reflect reductions in government outlays but only a switch from tax financing to debt issuance.

This issue has been examined in a number of earlier studies, several of which have found that the Ricardian hypothesis could not be rejected by the data. Several of these papers have stressed the argument that Ricardian households would pay attention to the permanent rather than the current level of government spending even though the concept of permanent government spending is difficult to measure empirically.

In this paper, the implications of this hypothesis for the definitions of both income and wealth have been treated simultaneously. In addition, this paper is the first to use national balance sheet data on private holdings of tangible and financial assets to examine this issue.

Overall, the results here do not support the Ricardian hypothesis.[35] Although they are somewhat mixed, all the equations reported in this paper find that consumption is affected by the level of real private sector wealth, but this finding does not depend on whether private wealth is defined to include or to exclude the stock of government debt. However, the overall fit of the equations is reduced when wealth is defined to exclude government debt.

In addition, contrary to the predictions of the Ricardian approach, the results indicate that, in the *current* year, consumption responds strongly to changes in government taxes. Decreases in federal government tax collections cause households to add to their household consumption, even if these decreases are not accompanied by cuts in government spending.

Nevertheless, although a federal tax reduction tends to stimulate the current year's consumption, the Ricardian hypothesis that the resulting higher level of government debt has no positive wealth effect on household outlays in subsequent years cannot be rejected at conventional levels of statistical significance. Proponents of the Ricardian view might interpret this result as indicating that households recognize and pay attention to the tax burdens associated with higher levels of federal debt once that debt has been issued. However, the alternate, Keynesian, view also is not rejected by the estimated equations.

The approach adopted in this paper has the advantage that income and wealth are treated in a consistent fashion. However, it must be recognized that some issues emphasized by earlier studies of the Ricardian equivalence hypothesis have been ignored. The most important of these are the assumptions that current income and current government expenditures are adequate proxies for the long-run or "permanent" levels of these variables.

In particular, the finding that changes in current taxes have a strong effect on consumption may be sensitive to the assumption that current government outlays provide a good forecast of future outlays. On the one hand, if the Ricardian hypothesis were correct, consumption would depend on the permanent level of government spending. In such a case, if the current level of government expenditures were a poor proxy for its permanent level, the equations would be mis-specified. On the other

hand, given the difficulty of predicting government outlays, it seems unlikely that an alternative proxy would be superior.

Subject to these limitations, the results presented here have implications for the conduct of fiscal policy. They suggest that while the immediate effects of deficit financing on household consumption and savings decisions are reasonably clear-cut, the long-run effects are more uncertain. In the short run, reductions in taxes tend to stimulate household outlays as a larger share of the GNP reaches the hands of the private sector. In the longer run, however, when deficit spending shows up in the form of a larger federal debt, it is uncertain whether taxpayers will treat that debt as an addition to their wealth justifying permanently higher expenditure levels.

FOOTNOTES

1. These are convenient but not wholly accurate labels. David Ricardo clearly had some doubts about the hypothesis that today bears his name. The theory of consumption that I describe as Keynesian in this paper reflects the views of several economists besides John Maynard Keynes, and might more accurately be labeled the "mainstream" approach.

2. In addition to levying taxes and borrowing, the government also has the option of financing its expenditures by creating new money. However, the choice between issuing new debt or new money is a matter of *monetary*, rather than *fiscal*, policy. In the United States, this decision is made by the Federal Reserve rather than the Treasury or the Congress. In order to focus attention on *fiscal* policy, I shall assume that monetary policy is constant — in the sense that there is no change in the rate of money creation — so that taxing and borrowing are the only alternative financing methods available.

3. Most economists in the Keynesian tradition argued that the effect on aggregate demand of an equal increase in both government expenditures and tax revenues would be small but not zero. This proposition is known as the 'balanced budget multiplier theorem'.

4. An early treatment of this argument can be found in Martin J. Bailey, *National Income and the Price Level*, McGraw-Hill Book Co., 1962, pp 71-81. Much of the recent interest in the argument stems from Robert J. Barro, "Are Government Bonds Net Wealth?", *Journal of Political Economy*, 82, Nov-Dec 1974.

5. It always was recognized that the expansionary effects of deficit financing might be partially offset ("crowded out") by a rise in interest rates if monetary policy did not accommodate the increased demand for money associated with rising levels of nominal income. For a detailed discussion of crowding out, see Alan S. Blinder and Robert M. Solow, "Does Fiscal Policy Matter", *Journal of Public Economics*, 1973. However, the recent challenges to fiscal policy do not rely on this crowding out argument, but instead deny that budget deficits *per se* stimulate aggregate demand.

6. Conversely, if current taxes are increased with no change in the government's non-interest outlays, the government debt will be lower in the future than it otherwise would have been, and hence future taxes also will be lower because the required payments of debt interest will be reduced.

7. David Ricardo, *Funding System*, 1820. Reprinted in P. Sraffa (Editor) *The Works and Correspondence of David Ricardo*, Vol IV, 1951, p. 143.

8. For a non-technical discussion of these issues, see Phillip Cagan, "The Effects of Government Deficits on Aggregate Demand and Financial Markets: A Wide-Ranging Review of the Literature and Current Policy Issues", *Proceedings of the Sixth West Coast Academic/Federal Reserve Economic Research Seminar*, Federal Reserve Bank of San Francisco, November 1983, pp 99-106.

9. Thus one of the first modern articles describing the Ricardian equivalence theorem was Robert J. Barro, "Are Government Bonds Net Wealth?", *Journal of Political Economy*, 82, Nov-Dec, 1974.

10. "It would be difficult to convince a man . . . that a perpetual payment of 50 pounds per annum was equally burdensome with a single tax of 1000 pounds. He would have some vague notion that the 50 pounds per annum would be paid by posterity, and would not be paid by him. . . That an annual tax of 50 pounds is not deemed the same in amount as 1000 pounds ready money, must have been observed by everybody." David Ricardo, *Funding System*, p. 187. In modern terms, it seems clear that in this passage Ricardo is suggesting that most persons are afflicted by fiscal illusion.

11. "When the pressure of the war is felt at once, without mitigation, we shall be less disposed wantonly to engage in an expensive contest, and if engaged in it, we shall be sooner disposed to get out of it, unless it be a contest for some great national interest." Ricardo, *Op. cit.*, p. 186.

12. A third argument against the equivalence theorem is that it assumes that private agents are able to borrow and lend at the same interest rate as the government, whereas, in fact, the private sector rate generally is higher. This means that when the government lowers taxes without reducing its expenditures, the value of the securities that it must issue *exceeds* the present value (to the private sector) of the resulting future tax burden, because the latter is discounted back to the present at a higher rate of interest than the securities yield. Hence such a policy action adds to the total wealth of the private sector and so encourages a higher level of consumption. The second argument made in the text really is an extreme case of this point, since if a household is totally unable to borrow, this means that the 'borrowing rate' it faces is infinitely large.

13. Most economists, regardless of whether they accept the Ricardian equivalence hypothesis, argue that consumption depends on some measure of long-run or 'permanent' income, rather than on current income, because household plans are made over a relatively long horizon. In this paper, my focus is on the role of government spending, taxing and borrowing in the consumption decision and hence the distinction between current and permanent income is ignored.

14. T represents *net* tax payments after deducting all government transfers to households, including payments of interest on the public debt.

15. The wealth of individual households also includes privately-issued financial assets. But for the economy as a whole, holdings of private financial claims are exactly offset by the corresponding private financial liabilities, so that *aggregate* private wealth includes only tangible assets and financial claims on the government (plus net claims on foreigners, which are ignored in this equation). Throughout this paper I assume that it is aggregate wealth that matters so that it is legitimate to 'net out' private financial assets against private liabilities. This assumption amounts to ignoring the effects of the *distribution* of assets and liabilities among households. Similarly, the use of national income rather than personal income as the income variable assumes that the distribution of income between households and corporations (that is, the distribution of profits between dividends and retained earnings) does not affect consumption.

16. As pointed out earlier, Ricardian equivalence implies that households should take account of any *expected future* changes in government spending, since these will imply future changes in taxes. Some studies of the equivalence hypothesis have made consumption depend on "permanent" or long-run government spending, though finding a suitable empirical proxy for this concept is not easy. See, for example, John J. Seater and Roberto S. Mariano, "New tests of the life cycle and tax discounting hypotheses", *Journal of Monetary Economics*, Volume 15, No. 2, March 1985. In this paper I essentially assume that current government spending is the best available forecast of future spending.

17. In the simple examples shown in the following equations, it is assumed that current saving is the only source of increases in real wealth. Other sources of change in real wealth — changes in the nominal prices of assets, the effects of inflation, and the depreciation of tangible assets — are ignored. These factors are discussed below and are incorporated in the empirical work. The examples also ignore foreign investment.

18. To show precisely how each of these factors enters the year-to-year change in the real value of wealth, let A_t represent the real stock of assets at date t, q_t the average price of these assets, d the rate of physical depreciation of assets, and S_t the flow of nominal saving in the year beginning at date t. Then

$$q_{t+1}A_{t+1} = q_{t+1}A_t - dq_{t+1}A_t + S_t$$
$$= q_tA_t - dq_{t+1}A_t + (q_{t+1} - q_t)A_t + S_t$$

This equation says that the *nominal* value of assets at date t+1 is equal to their nominal value at date t, minus the physical depreciation occurring during the year beginning at date t, plus the revaluations due to changes in asset prices over that year and plus nominal gross saving in the year.

If p_t is the price of consumption goods in the year beginning at date t, this equation may be written in *real* terms as

$$q_{t+1}A_{t+1}/p_t =$$
$$\{[q_tA_t - dq_{t+1}A_t + (q_{t+1} - q_t)A_t]/p_{t-1}\}$$
$$- \{[q_tA_t - dq_{t+1}A_t + (q_{t+1} - q_t)A_t]/p_{t-1}\}\cdot\{(p_t - p_{t-1})/p_t\}$$
$$+ S_t/p_t$$

The left side of this expression represents the real value of wealth at the end of year t (date t+1). The first term in braces on the right side represents the value, deflated by year t−1 prices, of the asset stock at date t, minus the physical depreciation and plus the nominal valuation changes occurring in the year beginning at that date. The second term represents the change in the real value of these assets that results from the change in the general price level (that is, inflation) in year t, while the third term is gross real saving.

19. In principle, the revaluation variable should also be different in the two cases, since in the Keynesian case it should include, and in the Ricardian case it should exclude, changes in the value of the government debt due to variations in the prices of government securities. However, the national balance sheet data that are used in this study do not include estimates of revaluations of the government debt. Unofficial estimates of such revaluations do exist; however, in the interest of using a single consistent data set, these estimates were not used in this paper.

20. For an example, see Flint Brayton and Eileen Mauskopf, 'The Federal Reserve Board MPS quarterly economic model of the US economy', *Economic Modelling*, Volume 2, Number 2, July 1985, pp 182-186, and pp 222-226.

21. See Brian Horrigan and Aris Protopapadakis, 'Federal Deficits: A Faulty Gauge of Government's Impact on Financial Markets', *Business Review*, Federal Reserve Bank of Philadelphia, March/April 1982; and Robert Eisner, *How Real is the Federal Deficit?*, Free Press, New York, 1986.

22. Suppose there is no inflation, the government debt outstanding is $100, the interest rate is 5 percent so that the government's annual interest expense is $5, and this expense is fully paid out of taxes so there is no budget deficit. The inflation rate now rises to 10 percent and as a result the interest rate increases to 15 percent and the annual interest expense to $15. If the government does not raise taxes but instead borrows $10 a year, this will have no effect on the real value of the government debt because the added borrowing will exactly offset the inflation-induced decline in the real value of the previously-existing debt. Relying on this argument, these economists suggest that budget deficits resulting from inflation-induced increases in interest rates will have no effect on private demand.

23. The source of this estimate is Robert J Barro and Chaipat Shakosakul, "Measuring the Average Marginal Tax Rate from the Individual Income Tax", *Journal of Business*, October 1983.

24. Thus, the expected inflation rate in any quarter is being proxied by an average of the actually realized inflation rate before *and after* that quarter.

25. The national balance sheet data contain estimates of the annual depreciation on private tangible assets (including consumer durables) and of the revaluation of tangible, equity and foreign assets due to changes in asset prices. The 'loss' of real wealth due to inflation is calculated by multiplying the real value of wealth at the beginning of the year, less depreciation and plus asset revaluations, by the rate of consumer inflation during the year. In the "Keynesian" equations, real wealth includes, and in the Ricardian equations it excludes, the stock of government debt.

26. Full details of the definitions of the variables used are shown in a Statistical Appendix, available from the author.

27. The federal government sector is defined to include both the Federal Reserve Banks and the Sponsored Credit Agencies and Mortgage Pools, as well as the general government. This means that the undistributed profits of these bodies are included in the income of the federal government rather than the private sector as is done in the national income accounts. The government sectors are defined to exclude, and the private sector is defined to include, the operations of both federal and state and local government employee pension funds.

28. The depreciation variable is the same regardless of the level of consolidation. This is because the national balance sheets do not include the tangible assets of governments and thus all depreciation is on privately-owned tangibles.