The Impact of Fiscal Policy and Inflation on National Saving: the Italian Case

Introduction

The present paper uses Italian postwar data to address the following issues: (i) whether private agents consider government debt as part of their net wealth in making consumption decisions; (ii) whether inflation-induced capital losses suffered by the private sector, especially during the 1970s, have had any significant effect on aggregate consumption; (iii) what are the implications of (i) and (ii) above for the behaviour of private and national saving in Italy during the recent years of huge budget deficits and high inflation.

The first issue is of interest because it is related to the controversy arising from the so-called Ricardian Equivalence Proposition (REP hereafter), developed by Barro (1974): Barro's theorem states that deficit financing and taxation produce the same intertemporal allocation of consumption. It should be noticed that this proposition, though first stated by Ricardo, was squarely rejected by him as an empirically relevant one.[1]

To establish his proposition, Barro needs to assume that all government revenue is collected by lump-sum taxation, debt is believed to be eventually repaid, capital markets are perfect, there is no uncertainty (or, alternatively, there are complete markets) and agents are *effectively* infinite-lived. To motivate the latter assumption Barro shows that if agents derive utility from their heirs' utility, a chain of bequests links present and future generations so that each household behaves as if it were infinitely lived. In such a world, rational agents will recognize that the value of outstanding government debt is exactly offset by the future tax liabilities required to pay for interest and principal, and therefore will

[1] For a discussion on this point, see O'DRISCOLL (1977).

not consider national debt as part of their net wealth. Similarly, a switch from tax to bond financing of a given government expenditure will not affect private sector real cosumption, since borrowing merely replaces current with deferred taxation: private saving will thus rise one for one with an increase in government debt, leaving total saving and capital formation of the economy unaffected.

This line of reasoning stands in sharp contrast both with the "conventional" view according to which consumption is determined by current disposable income, possibly with some role for aggregate private wealth (inclusive of national debt) and with the Life Cycle Hypothesis (LCH), which implies that consumption depends on life resources consisting both of human wealth (the present discounted value of anticipated disposable income) and of the market value of non-human wealth. These alternative formulations differ from the REP because they dispense with a number of the assumptions that are required to derive that proposition. There are in fact several reasons to cast doubt on the empirical relevance of those assumptions:

(i) the argument proposed by Barro to motivate his assumption that agents are effectively infinite-lived will not hold if agents do not care for their heirs' utility, or if agents derive utility from the fact of leaving bequests to their descendants rather than by their descendants' utility itself, or if some households are at corner solutions (so that they would like to leave negative bequests to their descendants, if they were allowed to do so). If any of these remarks is true, the horizon that is relevant in consumption decisions is shorter than the horizon over which government debt is expected to be repaid. In addition, the empirical evidence surveyed by Modigliani (1984) indicates that bequests are a relatively modest component of private wealth;

(ii) Barro does not take into account possible distributional effects: different family size or preferences can also lead to the failure of the debt neutrality proposition and to the conclusion that a deficit-financed reduction in taxes will significantly raise current consumption;

(iii) if there is individual uncertainty about future income and there are no complete insurance markets, a debt-financed tax cut accompanied by a corresponding increase in future income tax liabilities will increase private consumption at the margin (as shown by Barsky, Mankiw and Zeldes, 1984);

(iv) if people cannot borrow at the same rate at which they can lend, one can expect the marginal propensity to consume out of a debt-financed tax break to be greater than zero, since in effect the government will be offering better terms of trade between current and future consumption than the capital market and will thus be changing the opportunity set that consumers face.

From the viewpoint of the tests employed in this paper all these possible sources of failure of Barro's conclusions will be observationally equivalent — in other words, a rejection of Barro's predictions will be unable to reveal which of the assumptions of his theorem fails. This should not however be source of excessive concern, if one is interested in the policy question of whether substituting debt for tax financing has any effect on private consumption.

The second issue that will be examined in the course of this paper is related to the recent proposals of correcting the national income accounts — and in particular disposable income and government deficit — for the inflation-induced capital losses on nominal government liabilities (Jump 1980, Siegel 1979, Cukierman and Mortensen 1983). Since, according to the REP, government debt is not part of net wealth, the entire deficit, and interest payments in particular, are of no consequence whatever. Hence, correcting the deficit for the inflation premium component of interest payments is a vacuous exercise. According to the conventional model, instead, government interest payments do matter, just as any other form of earned income or transfers, and the same is basically true of the LCH, with some qualifications discussed below. If people were entirely rational they should then include only the real interest bill in their income; in this case the deficit that would produce crowding out would indeed be that corrected for the inflation premium and hence the proposed correction would be appropriate and justified.

On the other hand, the proposition that consumption responds to real interest, though an implication of rational behaviour, cannot be taken for granted, especially on the face of much evidence suggesting that economic agents have serious difficulties piercing the inflation veil. If consumption responds to the nominal interest income, crowding out of saving and investment will result also from that fraction of debt-servicing that is purely compensation for inflation-induced capital losses. If so, the uncorrected (or only a partially corrected) deficit may provide a more useful measure of the impact of fiscal policy on the economy. We propose thus to bring to a test the validity of the rational behaviour assumption as an appropriate description of reality. Note that

the interest of such a test extends well beyond the issue of the appropriate correction of the accounts. Indeed inflation illusion would imply that in the presence of a sizable public debt (relative to income), inflation — as far as it is reflected in nominal interest rates — will tend to reduce national saving, unless taxes are raised enough to cover the payment of the inflation premium.

Italian data provide an ideal opportunity to test the aforementioned hypotheses. The key variables — debt, inflation and average propensity to consume — have in fact been moving dramatically in Italy over the postwar period, thus supplying a set of observations that should in principle permit to discriminate sharply between the competing hypotheses.

1. Development of the Empirical Tests

In this section we will propose three simple specifications of the consumption behaviour of the private sector, intended to capture respectively the salient features of the REP, the conventional view and the LCH. By making use of a few accounting relations, we derive a simple way of nesting the three hypotheses.

We rely on the following notation:

NNP	=	net national product
Y_d	=	disposable income
C_T	=	total consumption expenditure
C_p	=	private sector consumption expenditure
C_g	=	government consumption expenditure
S_p	=	(inflation-adjusted) saving of the private sector
S_g	=	(inflation-adjusted) saving of the government
S_T	=	$S_p + S_g$ = national saving
T	=	direct taxes minus net transfers plus indirect taxes (net of subsidies)
W	=	beginning of period wealth of the private sector, including government debt
D	=	beginning of period government debt, net of the holdings of the central bank and of the foreign sector

RD	=	nominal net interest payments on national debt (= interest paid minus interest received by the government)
rD	=	real net interest payments on national debt
pD	=	inflation-induced capital losses on national debt.

In a closed economy, the above-defined aggregates are linked by the following identities:

(1) $rD = RD - pD$

(2) $Y_d = NNP + rD - T$

(3) $S_p = Y_d - C_p$

(4) $NNP = C_p + C_g + S_p + S_g = C_T + S_T$

(5) $DEF = -S_g = C_g + rD - T$ = inflation-adjusted government deficit.

Notice that disposable income (Y_d) is not defined according to the national income accounts, since it includes the *ex-post* real interest payments (rD) on public debt, rather than the nominal interest (RD): in other words, Y_d is obtained by subtracting the inflation loss (pD) and taxes from net national product. Correspondingly, the government deficit (DEF) is lower than the conventional measure of deficit by the gains accruing to the government through the inflation loss suffered by the private sector (pD).

The REP model. The income variable that is relevant for a test of Barro's hypothesis is NNP minus government consumption, the reason being that the intertemporal budget constraint faced by private agents is defined by total physical output of the economy net of the resources used up by the government — irrespective of whether the government is using debt or taxes to finance the purchase of these resources. For the same reason, D, government debt, has to be netted out from the relevant wealth variable:

(6) $C_p = a\,(NNP - C_g) + b\,(W - D) = a\,(Y_d - DEF) + b\,(W - D)$

Using identities (3) and (5), equation (6) can be turned into an aggregate saving function:

(7) $S_T = (1 - a)\,(Y_d - DEF) - b\,(W - D)$

Equation (7) brings out the implication that in such an economy no crowding-out of investment can result from an increase in government debt, for a given level of government expenditures: a debt-financed decrease in taxes will increase DEF by the same amount as it increases Y_d, thereby leaving the total saving of the economy unaffected. This obviously also holds if one considers a switch between debt and the revenue accruing to the government from pD, for a given level of public expenditure.

The conventional model. This model can be expressed by means of the conventional consumption function:

$$(8) \qquad C_p = a\,Y_d + b\,W\,,$$

that can be again converted into an equivalent saving function:

$$(9) \qquad S_T = (1 - a)\,Y_d - DEF - b\,W$$

It is instructive to compare the predictions of (9) with its Barro-analogue in equation (7). Analyzing that relationship, it was seen that according to the REP national saving would not be affected by an equal-expenditure switch from taxes to debt-financing. Equation (9) instead shows that, according to the conventional model, an equal-expenditure increase in the government deficit ($\triangle$DEF) is expected to reduce total saving by an amount a$\triangle$DEF (since the direct effect $-\triangle$DEF is partly offset by the indirect effect $(1 - a)\ \triangle$DEF via the increase $\triangle$DEF in after-tax income Y_d). This implies that, for given income, the REP would predict that the switch from taxes to debt will not affect investment, whereas the conventional model would imply crowding-out in proportion to the marginal propensity to consume.

The LCH model. This theory leads to a consumption function that is a hybrid of the REP equation (6) and of the conventional model of equation (8). It implies in fact that consumption depends on income net of taxes and wealth, just like the conventional model. However, the relevant variables are not current income and taxes, but rather the present discounted value of these flows, as anticipated over the balance of life. These expectational elements create similarities with the REP model, in that current fiscal policy has implications for future tax flows, which in turn affect consumption.

For example, consider two economies having the same disposable income and the same level of government expenditure, and both pursuing a balanced-budget fiscal policy. Suppose however that the first economy has a positive initial debt, whereas the second has none. Then, in the first economy the government must collect more taxes to pay for the interest, and the present discounted value of these taxes will be (at least approximately) equal to the government debt held by the private sector. But any individual, in computing his lifetime resources, must deduct only the present value of the extra taxes that will be levied on *him* over the rest of *his* lifetime (a quantity that varies across individuals depending, for instance, on income, age and population trends). When the present value of these future tax liabilities are subtracted from each person's wealth one can readily establish (see Blanchard, 1985 and Sterling, 1985) that the conventional aggregate consumption function (8) must be modified by adding a term including the national debt D, say c D. The parameter c generally depends on b, on the interest rate and on the average remaining life of the current generation. In the limiting case of infinite life, the present value of the extra tax is precisely equal to the national debt, so that $c = -b$. Thus the LCH would imply, just as the REP, that the national debt is not part of net wealth. But if life is finite and Barro's assumption of perfect intergenerational links is rejected, c is necessarily smaller than b and could even be close to zero if the discount rate is high and one allows for liquidity constraints and for some myopia, justified by the extreme difficulty of accurately measuring the future distribution of the tax burden.

Similar considerations suggest that the LCH calls for adding to (8) a term in DEF, predicted to have a negative coefficient on the ground that, for a given level of current taxes, the presence of a deficit signals that future taxes will have to rise to service the interest (and pay back the principal) on new debt issues. Thus the LCH consumption function must be written as:

$$(10) \qquad C_p = a\,Y_d + b\,W + c\,D + f\,DEF$$

Again, with infinite life (as the REP effectively assumes), the present value of taxes to service DEF is precisely equal to $-$DEF and $f = -a$. Then the first and the last term of (10) combine into:

$$a\,\{\,[NNP - (T - rD)\,] - [C_g - (T - rD)]\,\} = a\,(NNP - C_g)\,,$$

and (10) effectively coincides with (6). The LCH instead, moving from the assumption that the planning horizon of consumers may be long but not infinite, suggests that $-a < f < 0$, where f should probably be close to zero.

It should be apparent by now that (10) provides the basis for a simultaneous test of the three competing hypotheses. All three imply that a and b should be positive and should have values presumably similar to those obtained in many previous estimates of the consumption function. As for c and f, they should be non positive and fall in the intervals $[-b, 0]$ and $[-a, 0]$ respectively. Values at or close to the upper bound would support the conventional view, values at or close to the lower bound would support the REP; the LCH would in principle be consistent with any value in the middle, though it suggests that they should fall not too far from the upper bound.

The effect of real interest payments on consumption. The coefficient of real interest payments implied by equation (10) is (a+f), since the variable appears both in Y_d (with a positive effect) and in DEF (with a negative one). However, the LCH model suggests the possibility that the propensity to consume out of real interest income may differ from the propensity to consume out of the remaining portion of income (a). Specifically, in periods and countries of high, variable and hard to predict inflation, the real rate is typically subject to great instability. The LCH suggests that, under these conditions, consumption is unlikely to respond fully to the vagaries of the real rate (r). It should rather respond primarily to some measure of the "permanent" real rate (r*) — changing slowly at best — and only to a limited extent to transitory deviations of the current real rate from the permanent one ($r - r^* = R - p - r^*$).

On the basis of these considerations, the response of consumption to the interest component of income can be modelled as:

$$g\, r^*\, D + g'\, (r - r^*)\, D\,,$$

where we would expect $g \simeq a$, but g' smaller than both g and a.[2]

[2] We are proceeding here under the implicit assumption that g and g' are greater than zero. However, the theory does not provide unambiguous predictions about the sign of the two coefficients, since a *coeteris paribus* rise in the real rate will increase consumption only if the income effect prevails on the substitution effect (assuming saving is regarded as a normal good).

This leads to the following equation, that will form the basis of our tests:[3]

$$\begin{aligned}(11)\qquad C_p &= a\,Y_d + b\,W + [c + (g-g')r^*]\,D + f\,DEF \\ &\quad + [g' - (a-f)]\,rD = \\ &\quad a_1\,Y_d + a_2\,W + a_3\,D + a_4\,DEF + a_5\,rD.\end{aligned}$$

For the REP, interest does not matter ($g = g' = 0$) and a_3 reduces to c, which in turn, as explained above, should be equal to $-a_2$. On the other hand, for the LCH, a_3 should be larger than $-a_2$, and could even be positive. Similarly, a_5 should be zero for the REP (since $g' = 0$ and $a = -f$) and of uncertain sign for the LCH, though likely
to be negative (as for that theory both g' and f are likely to be small relative to a).

Testing for rational behaviour. Up to this point we have not considered the possibility that the private sector may suffer from some inflation illusion, in the sense of basing consumption decisions on nominal rather than real interest payments. This issue is of course relevant only within the framework of the conventional and of the LCH model. In the REP model, in fact, all transfers to and from the government do not affect intertemporal decisions by households — irrespectively of whether they are real or purely nominal transfers.

To test for the presence of inflation illusion we can make a simple aggregation assumption: a proportion $1-v$ of households is assumed to act rationally, and to consume according to equation (11), whereas the remaining fraction v of the population is characterized by complete inflation illusion, in the sense that their consumption is controlled by nominal (RD) rather than by real interest payments. In particular, we assume that their propensity to consume out of nominal interest payments is a fraction g" — while their propensity to consume out of non-interest income and out of wealth are the same as those of the rational consumers. Aggregate private consumption C_p can then be written as:

[3] A comment is in order at this point: since wealth consists of a stream of future net real cash flows discounted at the real interest rate, changes in the latter will also affect consumption via induced changes in W. If however W is measured at market value, there is no need to account explicitly for this additional linkage between real rate and consumption.

$$(12) \quad C_p = a(Y_d - rD) + bW + [c + (1-v)(g-g')r^*]D + f(DEF - rD) + [(1-v)g' + vg'']RD - (1-v)g'pD = b_1 Y_d + b_2 W + b_3 D + b_4 DEF + b_5 RD + b_6 pD$$

A finding that $b_6 = -b_5$ would imply that *all* consumers act rationally ($v = 0$); if, on the other hand, b_6 were to fall in the range $(-b_5, 0)$, one could infer that v is positive and hence that there is at least some inflation illusion. The limiting case in which $b_6 = 0$ and $b_5 = g''$ (as $v = 1$) suggests generalized and complete inflation illusion, *i.e.* aggregate consumption responding to nominal interest payments.

All this obviously assumes that the inflation loss that is relevant for consumption choices is known with certainty by households; in practice, however, this may not be the case (especially when such choices involve long term arrangements, such as the purchase or lease of durables) and consumers may have to rely on a forecast of future inflation in their decisions. In this case one has to substitute $p^e D$ for pD in equation (12): the coefficients will have exactly the same interpretation.

Decomposing government deficit. Equation (10) imposes the constraint that the sum of the coefficient of taxes and government expenditure should equal the negative of the coefficient on income. Recalling identities (4) and (5) above, we can rewrite equation (10) as:

$$(13) \quad C_p = a\,NNP + b\,W + c\,D + (f-a)(T - rD) - f\,C_g = c_1 NNP + c_2 W + c_3 D + c_4 (T - rD) + c_5 C_g$$

For the REP $c_5 = -c_1$ and $c_4 = 0$ (from (6)); for the conventional theory, $c_5 = 0$ and $c_4 = -c_1$ (as in equation (8)). Finally, the LCH is consistent with any order of these three parameters satisfying the inequality $0 < -c_4 = c_1 + c_5 < c_1$, though one would expect c_5 relatively small and hence $-c_4$ close to c_1.

It is apparent that all three hypotheses imply the constraint $-c_4 - c_5 = c_1$, which states that the loss of one unit of private resources to the government, whether perceived through tax payments or through government acquisitions of those resources, must reduce consumption by as much as the loss of one unit of income. This constraint is imposed by the specification of equation (11) or (12). Estimation of (13) serves to throw light on how closely the data satisfy this constraint, when it is not imposed.

2. Existing Evidence on the Ricardian Equivalence Proposition

Empirical tests on the extent to which consumers discount future tax liabilities implied by current deficits have been performed since the beginning of the 1970s. The first attempts have been made by Tanner (1970) and Kochin (1974) respectively on Canadian and American data.

After Barro's 1974 theoretical article, a wealth of empirical studies has been performed on this issue: the huge deficits that have recently characterized fiscal policy in the U.S. have contributed to heighten interest into the problem — since, if one were to accept Barro's view, such huge deficits "per se" should not be a policy concern. The tests performed by Tanner (1979) and Seater (1982) find that government debt does not have aggregate net wealth effects; Yawitz and Mayer (1976) and Buiter and Tobin (1979), use government deficits in the estimation of the aggregate consumption equation and find no support for the debt-neutrality hypothesis.

Feldstein (1982) improves upon previous research by splitting the deficit variable into taxes, transfers and government expenditure; on the presumption that taxes are not exogenous with respect to consumption he applies an instrumental variable procedure, and concludes that "changes in government spending and taxes can have substantial effects on aggregate demand" (1982, p. 16). Surprisingly, Kormendi (1983) finds instead support for Barro's hypothesis, though a rather mixed one — as he finds that positive taxes have no effect, but negative taxes (transfers) have a powerful one. However, his specification of the consumption function is seriously flawed both conceptually and in terms of specification (see Modigliani and Sterling, forthcoming).

Modigliani (1984) provides further extensive evidence in favour of the effectiveness of fiscal policy by producing estimates based on U.S. data from 1952 to 1983 and cross-section time-series data on a sample covering 33 countries for five selected years between 1960 and 1980.

As far as the Italian economy is concerned, the issue is of the utmost importance, given the magnitudes involved in recent years; indeed, starting from the late sixties, the debt/income ratio has in fact been growing at an average 5% per year. Despite its empirical relevance, the only attempt to test the debt neutrality proposition on Italian data has been performed — to the best of our knowledge — by Lecaldano *et al.* (1984, p. 84). Unfortunately, the authors fail to report their results explicitly, blaming the alleged inconclusiveness of the latter

on the quality and collinearity of the data. From their general remarks, it would however appear that the authors have misspecified their test by not including taxes as a separate regressor. They regress consumption on disposable income and government consumption, a specification that is bound to violate the rationality constraint that the sum of the coefficients of taxes and government expenditure be equal to the negative of the coefficient on income (unless the conventional model is true). As shown in Section 1, to avoid this, they should have included either government deficit or else government consumption and taxes as separate regressors.

3. Inflation and Consumption in the Italian Economy

All the recent studies of the consumption function in Italy notice that starting from the late sixties the private average propensity to consume (APC) — as traditionally measured from the national income accounts series — displayed a substantial downward trend[4] (see Figure 1). This has led a number of economists to consider whether the trend in the APC could be related to the upward trend of the inflation rate. In particular, one line of attack to this problem has been to deny its very existence by arguing that the apparent trend in the APC is really due to a mismeasurement of disposable income in an inflationary setting — the most recent expression of this view being Cukierman and Mortensen (1983). Indeed, in the late sixties and seventies the Italian economy has experienced accelerating inflation, increasing growth of the stock of government debt and increasing nominal interest rates. The large nominal interest payments received by the private sector have inflated nominal disposable income: this has, according to this literature, induced a spurious decrease in the APC, since measured disposable income includes interest payments but does not take into account the erosion of the real value of nominal assets due to inflation.

[4] It is worth noting that most previous studies have dealt with relatively short time intervals (at most from 1965 to 1979). As Figure 2 shows, inclusion of the last observations indicates that the negative trend of the APC during the 1970s is less strikingly negative than that found by previous studies (FRASCA *et al.*, 1979, ROSSI *et al.*, 1980, ROSSI and SCHIANTARELLI, 1982).

FIGURE 1

AVERAGE PROPENSITY TO CONSUME, AS FROM THE NATIONAL ACCOUNTS
($C_p/(Y_d + pD)$)

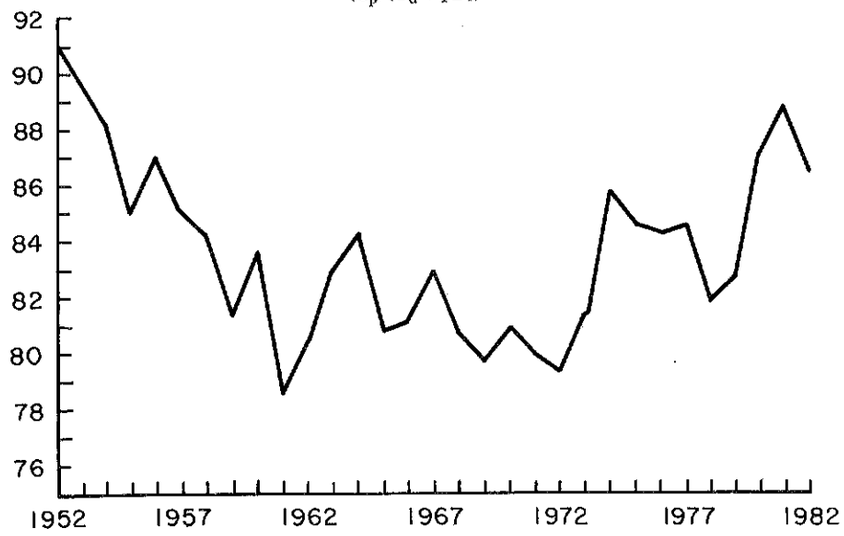
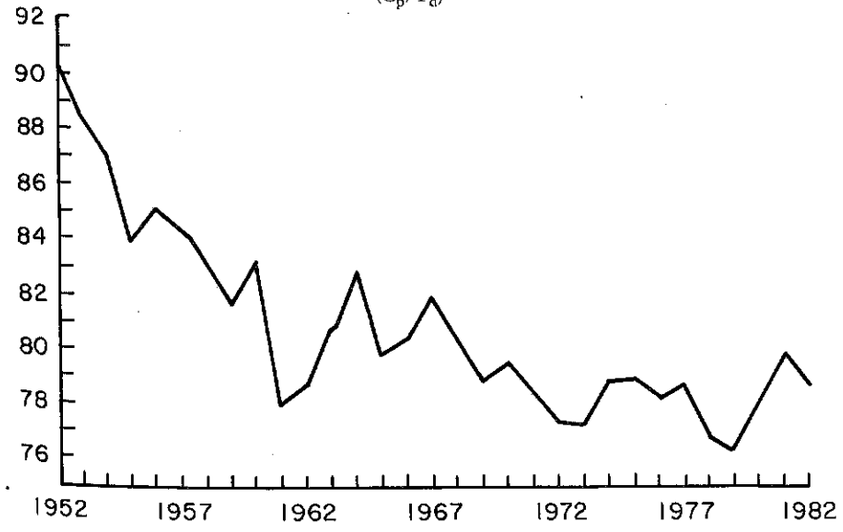


FIGURE 2

INFLATION-ADJUSTED AVERAGE PROPENSITY TO CONSUME
(C_p/Y_d)



However, from an economic point of view, the relevant issue is not whether changing the definition of income and saving changes the time pattern of the APC but rather whether behavioral relationships, such as consumption-saving decisions, do in fact reflect the distinction between real and nominal magnitudes, and in particular whether the private sector considers the inflation premium component of nominal interest payments just a compensation for the erosion of the value of outstanding nominal assets. The only existing studies that deal with this empirical question on Italian data are not able to reject the hypothesis of substantial degree of money illusion[5] (Frasca *et al.* 1979, Rossi *et al.* 1980, Rossi and Schiantarelli 1982, Marotta 1983, Lecaldano *et al.* 1984).

It is also noteworthy that, if one were to accept the proposed correction of disposable income as traditionally measured, the pattern of the resulting APC series would be dominated by the highly volatile capital loss component of the income series, as shown in Figure 2.[6] This seems to contradict the theoretical presumption that in the absence of money illusion, the corrected APC should be more nearly constant than the traditional measured APC (see Hendry and von Ungern-Sternberg, 1981, p. 247). Our approach to the issue is therefore that one should not simply assume complete absence of money illusion and proceed to correct national income accounts, but rather test whether money illusion is part of observed behaviour.

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[5] The most convincing piece of evidence is that of ROSSI and SCHIANTARELLI (1983). They apply a procedure first developed by HENDRY and VON UNGERN-STERNBERG (1980) and define perceived real income Y_o as

$$Y_o = Y_d - b\,[p^e/(1 + p^e)]\,FA$$

where FA is the real financial wealth held by households. In estimating the consumption function on quarterly data from 1965 to 1977 they find that they cannot reject the hypothesis of b equal to zero. This finding is confirmed by the results produced by ROSSI *et al.* (1980) and by MAROTTA (1983), who uses a different definition of Y_o and more recent data. Finally, LECALDANO *et al.* (1984) obtain reasonable results by choosing b = 0.5 and using actual instead of expected inflation.

[6] Here pD is the rate of inflation at the end of the period multiplied by the real net debt of the general government sector. We feel that when the economy is divided into private and government sectors it is easier to assess the capital losses of the private sector, since assets and liabilities within the private sector cancel out (if the rest-of-the-world sector is either small or does not exhibit a clear trend in the amount of net assets outstanding) and net government debt is what is left after aggregation. This provides a useful concept not only for assessing the effect of inflation but also for testing the Barro neutrality proposition.

4. Measuring the Deficit and the Debt

An important requirement for testing the model laid out in Section 1 is that the series on debt be consistent with the corresponding series on government deficit, *i.e.* that deficit in a given period be equal to the change in debt in the course of that period. Furthermore, a conceptual problem arises, in that, even according to the REP, the proposition that government debt should not be viewed as part of private net worth applies only to that portion of national debt that is not offset by government productive capital — *i.e.* capital acquired to produce a stream of future benefits, comparable to that generated by private capital. It is only this portion of the national debt, the so-called "deadweight debt" that should be excluded from private net wealth, according to the REP but not according to the LCH. Similarly, in terms of flows, the REP predicts that only a part of government consumption should reduce private consumption, namely current consumption expenditure; the corresponding relevant measure of real deficit is the current account deficit or total (inflation-corrected) deficit, less government capital formation, and this measure, in turn, must also correspond to the change in the (real) deadweight debt.

Past empirical investigations have tended to disregard this distinction and to use total debt (deficit) in place of deadweight debt (deficit). This approach is convenient from the point of view of data availability, but questionable especially in the case of Italy, where, according to official statistics, investment expenditure represents a very large portion of total government purchases of goods and services. Accordingly, to measure deficit as either total deficit or as the change in debt in testing the REP, risks to lead to a serious mispecification and to bias the results against the REP.

The alternative is to rely on the official classification and measure deadweight deficit as the current account deficit. However, this alternative may also not be entirely satisfactory, because it is most likely to underestimate appreciably the true measure. There are two considerations supporting this conjecture: (i) capital expenses, especially in recent years, probably include some items that are truly government consumption, such as the transfers that finance the losses of public sector corporations; (ii) the change in public debt is considerably larger than the total deficit reported in the national accounts, because there is a portion of new issues of public debt that finances expenditures not

reported either in the current account or in the capital account of the general government — and part of such expenditures probably are also true government consumption.

Thus, there appears to be no satisfactory solution to the problem of measuring government consumption and deadweight debt from readily available official statistics. We propose therefore to fall back on the following approximation. Denote the officially *measured* government consumption and deficit by C_g^m and DEF^m $(= C_g^m + rD - T)$ respectively. Then our assumption is that the true consumption C_g can be approximated by the measured current account expenditure C_g^m, plus some fraction of the new debt issues in excess of those financing the measured deficit DEF^m:

$$(14) \qquad C_g = C_g^m + h\,(\triangle D - DEF^m)\,,$$

where $\triangle D$ is the increase in total real national debt. When this assumption is substituted in (11), one finds that the term a_4 DEF in (11) can be replaced by:

$$(15) \qquad a_4\,DEF^m + a_6\,(\triangle D - DEF^m), \text{ where } a_6 = a_4\,h$$

Since we allow for two measures of deficit ($\triangle D$ and DEF^m) we should ideally have two measures of government debt in (11); unfortunately, the only available information relates to the total public debt, D. For obvious reasons there are no estimates of what portion of this total is attributable to the deadweight debt — nor is there any readily available method to estimate it: even cumulation of the current account deficit would run into an initial condition problem. Furthermore, as noted earlier, the budget current account understates the deficit and its cumulant understates the debt. Somewhat surprisingly, the current account measured in the official budget has been mostly in surplus in the '50s and '60s and very moderately in deficit since the '70s. Hence, the cumulation of the current account balance results in a negative debt which, however, constitutes but a small fraction of NNP. Considering that this estimate overstates the surplus, it seems appropriate to conclude that, in the case of Italy, the deadweight debt is likely to be sufficiently small to be safely neglected.

Thus, in our tests below, we use a single measure of national debt, namely the aggregate D. But, since this measure may be largely offset by government capital, even if the evidence should support the conclusion

that the debt is largely regarded by the private sector as a part of net worth, this finding should not be taken as a critical refutation of the REP.

5. Empirical Results

Tables 1, 2 and 3 report the result of a number of tests based on equation (11), (12) and (13). All the relevant variables used in Tables 1, 2 and 3 are defined in the Data Appendix, and the estimation is based on annual observations over the period 1952-82.[7] It should be noted that no official published series exists for total wealth for the period of estimation: we have attempted to put together an estimate of private net worth (omitting only the value of land) attempting to remedy the poor quality of the data by using all sources known to us. Nonetheless, on occasion we have been forced to fall back on guesswork lacking solid support.

Table 1 reports first an estimate of the conventional aggregate consumption function. The coefficient of the wealth variable is highly significant and large, considering that income includes property income. It is in line with comparable estimates for other OECD countries and higher than most recent estimates obtained with Italian data (see Rossi *et al.*, 1980, p. 143). The serial correlation of the error of equation 1.1, evidenced by a somewhat low DW statistic, does not seriously affect the values and significance of the estimated coefficients, as shown by equation 1.2. The same applies to the successive equations, so that only the AR1-corrected estimates are displayed.

Equation 1.3 provides an explicit test of the competing hypothesis about the effect of fiscal policies. The most important restriction implied by the REP is that the coefficient of the deadweight deficit should be equal to minus that of disposable income. It is seen that the coefficient on $(\triangle D - DEF^m)$ is close to zero (implying $a_6 = 0$ in (15)), and that of the narrower and less questionable measure DEF^m is

[7] As explained in the Data Appendix, our consumption variable includes expenditure on durables. Ideally, the appropriate series for consumption would only include the flow of services imputed to durables, but no such series exists for Italy. As a check on the sensitivity of our results to the definition of consumption, we have replicated them by subtracting durables (furniture, appliances and means of transportation) altogether: the results stay qualitatively unchanged.

TABLE 1 (*)

	Constant (1)	Y_d (2)	W (3)	ΔD-DEF^m (4)	DEF^m (5)	D (6)	rD (7)	Rho	DW	SE	Method
1.1	.031	.630	.043						1.10	.0100	OLS
	(5.00)	(32.03)	(10.91)								
1.2	.039	.594	.050					.538		.0091	AR1
	(3.76)	(20.85)	(8.93)					(3.51)			
1.3	.036	.604	.046	−.065	−.219	.018		.641		.0079	AR1
	(3.11)	(19.55)	(6.75)	(−1.04)	(−2.92)	(.40)		(4.34)			
1.4	.034	.609	.047	−.070	−.222			.631		.0078	AR1
	(3.18)	(21.71)	(8.29)	(−1.15)	(−3.01)			(4.25)			
1.5	.034	.603	.048		−.234			.654		.0078	AR1
	(3.03)	(21.07)	(8.75)		(−3.22)			(4.67)			
1.6	.036	.605	.047		−.190		−.097	.658		.0080	AR1
	(2.99)	(20.40)	(7.54)		(−1.57)		(−.49)	(4.61)			
1.7	.043	.604	.045				−.370	.673		.0082	AR1
	(3.60)	(19.52)	(7.12)				(−2.74)	(4.90)			
1.8	.024	.636	.043		−.200			.574		.0081	AR1-IV
	(2.11)	(20.67)	(7.50)		(−1.97)			(3.54)			

(*) t-statistics in parenthesis. The mean of the dependent variable is .616 (in 1970 bn Lit).

significantly negative, but is only around 30% of that of income. These results soundly reject the REP while being consistent with the LCH. The other point with respect to which the hypotheses have different implications is the coefficient of the public debt: for the REP, it should be the negative of that on wealth, for the LCH, small and probably positive. The result again supports the LCH,[8] though not very conclusively in view of the imprecision of the estimate. As can be seen from 1.4, dropping the entirely insignificant debt variable does not change any of

[8] If we reestimate equation 1.3 by entering debt and wealth *net* of debt, we obtain point estimates of 0.06 (with a t-statistic of 1.6) and 0.04 (with a t-statistic of 6.7) for the respective coefficients.

the remaining estimates appreciably. Since the contribution of the non current account deficit of column (4) remains small and insignificant, it is also dropped in 1.5. The remaining variables are all highly significant and consistent with the LCH but not with the REP.

Equation 1.6 offers a test of alternative hypotheses on the propensity to consume out of (real) government interest income. According to the standard view, this propensity should be the same as that for all other forms of taxes and transfers. The LCH suggests, instead, that it should be somewhat smaller, since the great volatility of the *ex-post* real rate during the sample period should induce consumers to regard most of its movements as transitory. Finally, according to the REP, that propensity should be zero, just as for taxes and transfers. Since the government interest is already included in disposable income and deficit, the traditional view implies that if the interest variable rD is added to equation 1.5, its coefficient should be zero; the REP implies that it should be the negative of the sum of the coefficients of the above variables, while the LCH implies a negative value in between. The estimated coefficient of rD in 1.6 is seen to be −.10: this implies a propensity to consume out of real interest income, g', qualitatively consistent with the LCH. However, the coefficient is so small and imprecisely estimated that one could hardly reject the traditional view. On the other hand, the coefficient appears substantially different from the value implied by the REP, *i.e.* $-(.605 - .190) = -.415$.

One somewhat surprising aspect of regression 1.6 is that the coefficient of deficit falls in value and especially in terms of statistical significance. This presumably arises from the interaction between real interest income and deficit, reflecting the impact on short-run movements of the deficit from the real interest payments on public debt during the last decade of high and variable inflation. Thus the estimate and significance of the deficit effect in 1.5 might well be upward biased, as the deficit could in part be proxying for the effect of interest income.

This conjecture receives some support from the test of row 1.7. It shows that, if we drop the deficit, the coefficient of the interest variable becomes a good deal more negative and highly significant. On the whole, in view of equation 1.6, we are inclined to regard equation 1.5 as the most reliable description of the forces impinging on consumption. However, we must recognize the possibility that the magnitude and significance of the effect of the deficit in 1.5 may be upward biased as it could be proxying for the effect of a low propensity to consume with respect to interest income.

Equation 1.8 concludes the battery of tests with an alternative estimate of 1.5, designed to correct for a possible simultaneity bias from the endogeneity of income and of the cyclical components of the surplus: we instrument for income and surplus by using exports, lagged taxes and government consumption. The estimated coefficients do not show any appreciable change, except for a modest reduction in the deficit coefficient and a substantial fall in the constant term, which in the earlier equations seemed to be unreasonably high.

The tests of Table 1 indicate that, contrary to the REP, consumption does respond to interest income earned on the national debt. This can best be seen from equation 2.1 in Table 2, which is the same as equation 1.6, except that we have taken the government interest component out of both interest and deficit, and therefore the coefficient of interest in column 5 measures its overall net effects. Since this effect is both large and significant, it is pertinent to ask whether the relevant measure of interest income is the real interest income or whether instead there is evidence that the public suffers from inflation illusion, basing consumption on nominal interest. We carry out this test by estimating the specification (12) derived in Section 1. Recall that full inflation illusion would reveal itself as a zero coefficient of pD, partial illusion in a negative coefficient (smaller than that of RD in absolute value), while a coefficient equal to the negative of that of RD implies absence of money illusion.

In equation 2.2 the point estimate of pD is negative and smaller than that of RD, implying partial money illusion. In fact, in view of the large standard error one cannot reject either the hypothesis that the coefficient of pD equals zero (complete money illusion) or that it equals the negative of that on RD (absence of money illusion).[9] Rows 2.3 and 2.4 offer an alternative test in which actual inflation is replaced by a measure of expected inflation,[10] but again no reliable conclusion is possible. We must conclude — in contrast with previous studies (Rossi and Schiantarelli 1982, Marotta 1983 and Lecaldano *et al.* 1984) — that the data do not enable us to come to clearcut conclusions with respect

[9] The null hypothesis of money illusion ($b_5 = 0$) can be tested by looking at the t-statistics on pD and p^eD, whereas the other null hypothesis of complete rationality ($b_5 = -b_6$) can be tested performing an F-test on the unrestricted equations 2.2 and 2.4 and their restricted counterparts 2.1 and 2.3.

[10] Expected inflation has been proxied by the fitted values of a two lags autoregression of inflation on the nominal interest rate and the exchange rate. Other forecasts — obtained with a higher number of lags or a wider set of regressors (such as M1 and income) — have turned out to produce almost identical results.

TABLE 2 (*)

	Constant (1)	Y_d-rD (2)	W (3)	DEF^m-rD (4)	rD (5)	RD (6)	pD (7)	Rho	SE	Method
2.1	.039	.605	.047	−.190	.318			.658	.0080	AR1
	(2.98)	(20.40)	(7.54)	(−1.57)	(2.36)			(4.61)		
2.2	.043	.614	.040	−.163		.406	−.208	.667	.0080	AR1
	(2.71)	(18.48)	(3.26)	(−1.25)		(2.13)	(−.98)	(4.74)		
	Constant (1)	Y_d-rD (2)	W (3)	DEF^m-rD (4)	RD-p^eD (5)	RD (6)	p^eD (7)	Rho	SE	Method
2.3	.040	.612	.043	−.078	.124			.659	.0088	AR1
	(2.92)	(18.29)	(6.42)	(−.615)	(.71)			(4.47)		
2.4	.056	.622	.029	−.133		.386	.139	.743	.0082	AR1
	(3.46)	(17.87)	(2.98)	(−1.11)		(1.83)	(.72)	(6.02)		

(*) See footnote to Table 1. In regressions (2.3) and (2.4) the estimation period is 1953-82 (whereas in all other regressions it also includes 1952).

to the role of an inflation bias in the private sector valuation of interest income on government debt (all other interest income can be disregarded, as it represents a transfer within the private sector). While the point estimates of our coefficients tend to be consistent with the hypothesis of some inflation illusion, their standard errors are so large (presumably reflecting collinearity) that we must regard the issue as wide open and worthy of further investigation.

It may be of some interest to repeat the main tests of Table 1 dropping the constraint on the components of the government deficit, as explained in Section 2, that is, entering taxes and government expenditure as separate variables. The purpose is two-fold: (i) to determine whether eliminating the constraint changes appreciably our results and (ii) testing whether the constraint is consistent with the data.

The test is reported in Table 3. Income is now measured by net national product, and taxes by total taxes net of transfers, including real interest on government debt (T − rD). As for government expenditure, it is measured by the series reported in the national accounts (C^m_g), the measure supported by the results in Table 1 discussed above.

TABLE 3 (*)

	Constant (1)	NNP (2)	W (3)	T−rD (4)	C_g^m (5)	Rho	SE	Method
3.1	.046	.550	.033	−.202	.146	.476	.0069	AR1
	(5.03)	(16.28)	(5.44)	(−2.29)	(.88)	(2.77)		
3.2	.036	.591	.034	−.301	.039	.435	.0072	AR1-IV
	(3.65)	(15.83)	(5.19)	(−2.31)	(.22)	(2.40)		

(*) See footnote to Table 1.

In some respects, the results reported in row 1 of Table 3 are even more unfavourable to the REP than those of Table 1, in that the crucial coefficient of government consumption is insignificantly different from zero and very significantly different from the predicted value of minus the income coefficient (i.e. −.55). However, in other respects the results are puzzling. In particular, although the tax coefficient is significantly negative, confirming the rejection of the REP, it is substantially lower, in absolute value, than that implied by 1.5 (namely, −.60 + .23 = −.37). In fact, it is uncomfortably low from an LCH perspective. Also, the coefficient on income, already unusually low in 1.5, becomes even lower in 3.1. It is therefore not surprising that a formal test leads to the conclusion that the constraint imposed by 1.5 is rejected even at the 1% level of significance.

In assessing this result one should recognize that the coefficients of equation 3.1 are potentially biased by several factors: (i) what one should really include in the consumption function is a variable proxying for the permanent level of taxes:[11] since a transitory change in taxes will affect consumption less than a permanent change of the same magnitude, if one uses the observed series on taxes, he should expect the estimate of the tax coefficient to be less than that of income, implying that the tax coefficient in Table 3 is an upward biased estimate of the

[11] This is of special relevance for the Italian economy, where sudden and unexpected levies have been repeatedly imposed during the '70s, inducing substantial noise in the process generating observed data (see ROSSI and TRESOLDI, in FRASCA *et al.*, 1979).

long run one; (ii) as remarked by Feldstein (1982), taxes — being a cyclically responsive variable — cannot be regarded as predetermined with respect to consumption, because, over the business cycle, higher income leads to higher consumption and taxes, thus inducing a bias in the same direction as that caused by the noise factor discussed under (i).

We endeavour to correct for the potential endogeneity of taxes and income by an instrumental variable procedure (the instrument chosen being exports and lagged taxes). The results, reported in regression 3.2, move further in the direction of supporting the LCH and rejecting the REP, as the tax coefficient is closer to minus the income coefficient, while that of government expenditure remains around zero. Yet, the puzzle is not fully dissipated, in that if the unconstrained equation 3.2 is compared with the constrained equation 1.8 (estimated with the same set of instruments), one finds that the data again reject the constraint at the 1% level.

These results may be summarized as follows: 1) tests of significance point to the conclusion that the constraint imposed in the tests of Table 1 is not tenable; 2) when the constraint is removed the results turn to be even more unfavorable to the REP; 3) however, it is impossible to attribute economic meaning to the rejection of this constraint, which should hold for everyone of the competing hypothesis; 4) accordingly, we conjecture that the failure of this constraint is likely to reflect measurement errors and the possible omission of some important variable (including lags).

On the basis of these considerations, we conclude that the results of Table 1, and in particular of the constrained equations 1.5 and 1.8, despite their somewhat worse fit than 3.1 and 3.2, provide, at the moment the most reliable description of consumption behaviour of the Italian economy and of the impact of fiscal variables on said behaviour.

6. What Has Driven National Saving?

Our purpose, in this closing section, is to use the results of Section 5 to help throw light on the causes of the extraordinary variation in national saving over the last thirty years and in particular on the role played by fiscal policy in explaining its behaviour.

This can be done by turning equation (11) into a saving function:

$$(16) \qquad S_T = (1-a)\,Y_d - (1-f)\,DEF - b\,W - [c + (g - g')\,r^*]\,D - (g' - a + f)\,rD$$

Constraining the coefficients on debt and on the real rate to be zero, as warranted by their t-statistics in Table 1, and substituting the estimates of equation 1.8 for the remaining coefficients, we obtain the predicted value of S_T, $\hat{S}_T$:

$$(17) \qquad \hat{S}_T = -.024 + .368\,Y_d - .813\,DEF^m - .044\,W$$

Making use of the identities $Y_d = NNP - T + rD$ and $DEF^m = C_g^m - T + rD$, and dividing through by NNP, we finally arrive at the following expression for the predicted national saving rate:

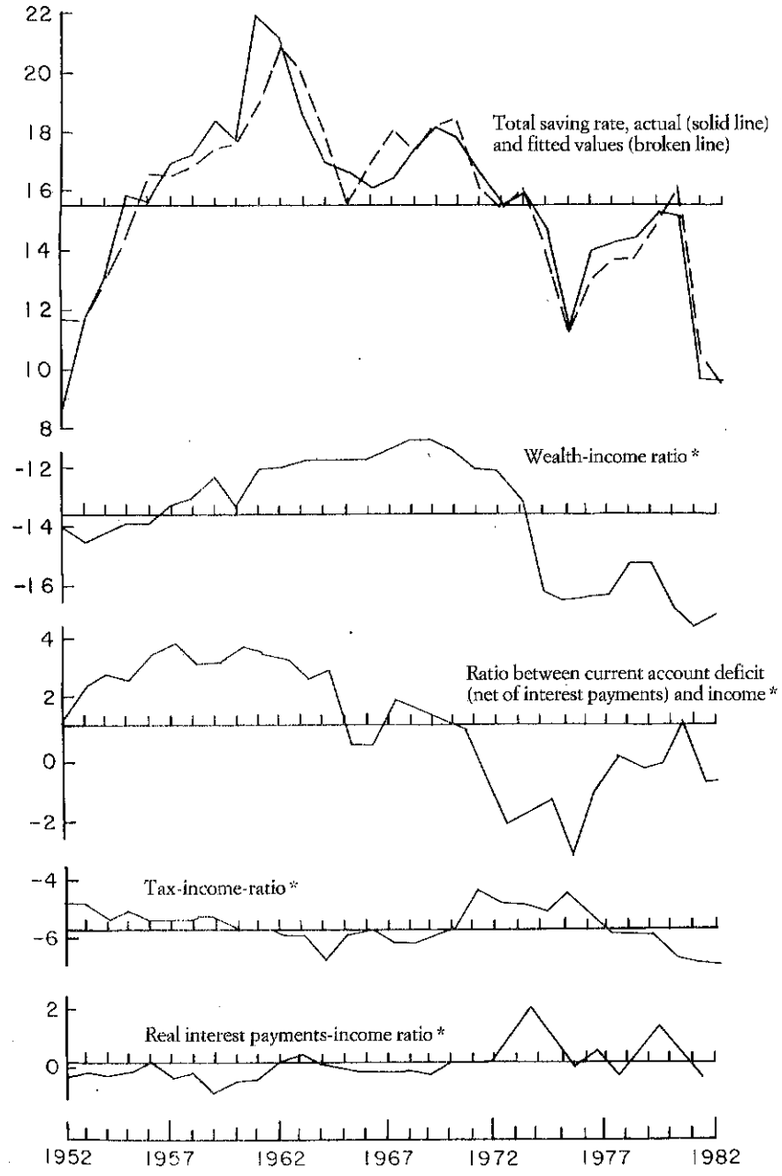
$$(18) \qquad \hat{S}_T/NNP = .368 - .368\,T/NNP - .813\,(C_g^m - T)/NNP - .044\,W/NNP - .445\,rD/NNP - .024/NNP\,.$$

Equation (18) shows that if government consumption C_g^m is increased by 1% of NNP, and taxes are held constant, the resulting increase in deficit reduces the saving rate by .81 of 1%; on the other hand, a 1 percentage point rise in deficit, brought about by a fall in taxes, for a given level of government consumption, reduces the saving rate by .44 of a percentage point, as the increased absorbtion of resources by the government is offset in part by a larger flow of private saving, resulting from the rise in disposable income.

In Figure 3 we have plotted the actual saving rate and the fitted values based on equation (18), together with the values of the right-hand side variables, each multiplied by its coefficient in the regression (note that all variables are expressed as percentages of NNP). The figure brings out the magnitude and pattern of the movements in the saving rate over the 30 years of our sample: the swings of this variable, from an initial value of 8.5 to a peak of 22 and back to 9.5, are truly remarkable, especially when one recalls that the saving ratio has long been regarded as a stable characteristic of an economy, except for purely cyclical short-run fluctuations.

The lower half of Figure 3 and Table 4 are designed to bring out the forces that — according to our analysis — account for these wide, rapid swings. They do so by showing how each of the independent

FIGURE 3



* Multiplied by its coefficient in equation (18)

variables of equation (18) contributes to the overall movement of the saving ratio, which is the sum of the component series, up to a residual error.

The 1953-63 decade is characterized by a remarkable growth in the saving rate of nearly 7 percentage points. Our equation accounts for almost half of that rise in terms of the decline of the wealth-income ratio. That decline, in turn, reflected the rapid growth of income outpacing wealth and leading the private sector to raise its saving rate in an effort to restore a normal relation between wealth and income. Fiscal variables play instead a very minor role, since the combined positive effect of the rising surplus and declining real interest payments (amounting to 1.0) was almost exactly balanced by the effect of an increase in expenditure financed by net taxes (–.95), that reduced disposable income and saving. One further significant effect comes from what may be labeled the "absolute income" effect, reflected in the positive constant term of equation (18): its impact on the saving ratio is shown in column 6 of Table 4. This effect was once regarded as the only systematic force affecting the saving rate — the richer the country the higher the saving rate. The theories that in the '50s and early '60s replaced the naive Keynesian consumption function, such as the Life Cycle and the Permanent Income Hypothesis, instead implied independence of the saving rate from the absolute level of income — at least at the macro level. This in turn would call for a zero constant term and no effect in column 6. Actually most of our estimated equations

TABLE 4 (*)

BREAKDOWN OF THE CHANGE IN THE NATIONAL SAVING RATE

Periods	Actual	$\frac{W}{NNP}$	$\frac{C_G^m - T}{NNP}$	$\frac{rD}{NNP}$	$\frac{T}{NNP}$	$\frac{1}{NNP}$	Unexplained	$\frac{I_P}{NNP}$	$\frac{I_G}{NNP}$	$\frac{NL}{NNP}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
53-63	6.89	2.71	.34	.66	–.95	2.82	1.31	6.86	–.16	.19
63-70	– .73	.34	–1.55	–.34	.13	.99	–.30	–3.59	.12	2.74
70-82	–8.28	–5.57	–1.89	–.42	–1.29	.43	.46	–6.37	1.20	–3.11

(*) Each variable in columns (2) to (6) is multiplied by its coefficient in equation (20).
I_P = net private investment;
I_G = net government investment;
NL = net lending to the rest of the world.

exhibit a relatively small constant term (between 1/20 and 1/25 of mean *per capita* consumption). Nonetheless, for the first period the constant term is seen to make a rather large contribution to the explanation of the saving rate. However, we are inclined to believe that the true constant is around zero, and the effect measured in column 6 reflects mispecifications, which hopefully do not have serious consequences on our other parameter estimates.

In the second period (1963-73), the saving rate declines at first with the slowdown following the monetary stringency of 1964. It then recovers in the second half of the decade but overall it does not show an appreciable trend, as the changes in the various causal factors are rather small and largely offsetting. The wealth effect is amost null, as the growth of income, moderate on the average, was consistent with a stable wealth-income ratio. At the same time, the government surplus (net of interest payments) shrinks from 3.2% of national product in 1963 to 1.3% in 1970, since the increase in expenditure and real interest payments is only partly compensated by an increase in taxes, so that the overall effect of the fiscal variables on saving is to reduce it by more than 1.5 percentage points.

But it is during the most recent period (1970-82), following the real wage shock of the end of the '60s, that saving undergoes a dramatic decline of more than 8 percentage points. According to our equation, the major cause — accounting for about 2/3 of the effect — appears to be the rise in the wealth-income ratio, reflecting a deceleration in income growth, and, to some extent, large capital gains on the housing stock in 1973-74 and on the stock market in 1980. The remaining 1/3 can be primarily attributed to fiscal policy, and results from a significant increase in expenditure (from 15% of NNP in 1970 to 19% in 1982), whose effect was magnified by the fact that the rise in taxes matched only about 2/3 of that rise. As a result, the deficit also rose, by 2.3 percentage points of NNP, contributing 1.9 percentage points to the decline of national saving.

Considering the amount of attention that has been given to the problem of government deficit in recent years, and in view of the commonly quoted estimates of such deficits, reaching as high as 18% of NNP in 1982, it may appear surprising that our growth in deficit in the last decade is a mere 2.3% of NNP. Furthermore, even this change is due not so much to a rise in deficit as to a disappearance of government surpluses. The explanation is that most of the deficit that is at the center of the public debate is accounted for by the financing of capital

formation as well as the acquisition of financial assets, and, since the mid '70s, by the inflation-swollen nominal interest payments. Neither of these components is included in our measure, which is the difference between government consumption and taxes net of transfers ($C_g^m - T$). Note that our measure excludes also the real interest bill which, however, is typically small (and even negative) despite the growing ratio of debt to income.

To be sure, that portion of the rise in deficit that we leave out because it finances capital formation, may — as suggested earlier — cover expenditures which should more properly be treated as current consumption, such as those covering losses of government corporations. To the extent that this is true, and that this practice has grown in importance during the '70s, as seems likely, our figures underestimate the decline in national saving as well as the contribution of government deficit to that decline. Unfortunately, though we have a strong suspicion of downward bias in our estimates, we are in no position to even guess its magnitude.

National saving is the source of funds which finances three uses: private investment, public investment and capital exports. It is of some interest to inquire how the wide movements of the saving rate have affected these alternative uses, and, in particular, how far they have impinged on the movements in that vital component consisting of private investment.

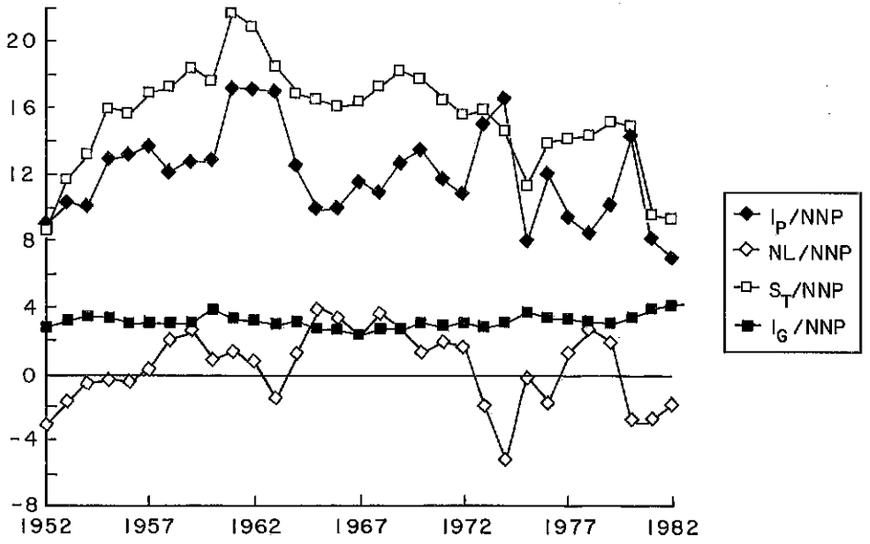
To throw light on this question, we have plotted in Figure 4 the three relevant components, as a percentage of NNP, together with the saving rate, and report in columns (8), (9) and (10) of Table 4 a breakdown of the change in the components of the overall saving rate for the three subperiods.

During the first period, we note that the increase in saving is totally reflected in a corresponding increase in private investment: in other words, the investment boom of the "miracolo economico" was financed by the high and rising private saving rate, with some help from a "sound" fiscal policy, and without significant recourse to foreign capital. With the slowdown of income growth after the early '60s and the abatement of the private investment boom, the utilization of the still high rate of saving shifted to a marked extent from the financing of domestic investment to that of financing capital exports, especially towards the end of the period.

Finally, in the more recent period, following 1970, the sharp decrease in saving, together with a further rise in government investment, had a substantial effect in crowding out private investment (from an average of 17% of NNP in the early '60s to an average of 7.8% in the last two years), despite some relief from capital movements that resulted in a moderate inflow of foreign capital at the beginning of the '80s.

FIGURE 4

NATIONAL SAVING RATE AND ITS BREAKDOWN INTO NET PRIVATE INVESTMENT RATE, NET PUBLIC INVESTMENT RATE AND RATE OF NET LENDING TO THE REST OF THE WORLD (RELATIVE TO NNP)*



* For the definition of the variables, see footnote to Table 4.

7. Conclusions

The Ricardian equivalence proposition has the striking implication that, for a given level of government consumption, the choice between borrowing and taxing is of no economic importance. For rather different reasons, the proponents of the view that in an inflationary setting national income accounts mismeasure economic magnitudes get to the same conclusion — that recent deficits did not matter: for, once the deficits are corrected for inflation-induced capital gains accrued to the government, they are not really very large.

In contrast with the Ricardian equivalence proposition, we find that government debt has a substantial wealth effect, and that government deficits matter — in that they reduce national saving almost one for one. We estimate that an increase in government deficits of around 4 percentage points of Net National Product since the early '60s has reduced the national saving rate by approximately 3.4 points out of a total decline of some 9 points. This rise in deficit is not as large as commonly believed, because we estimate, in agreement with other authors, that when the deficit is corrected for the effect of inflation on nominal interest rates and for government investments, the rise in deficits, though appreciable, is puny compared to the change in unadjusted deficit more commonly quoted.

From an economic point of view, correcting deficits for inflation is warranted only if consumption-saving choices are primarily affected by real, and not nominal interest payments. When we attempted to test for the effect of inflation we were not able to reject either complete rationality or complete inflation illusion. This might be due to the fact that the test cannot distinguish between the response of rational consumers to short-run fluctuations in real interest income and the response of irrational consumers suffering from inflation illusion to the inflation premium component of nominal interest payments. Hopefully, further research will help to clarify these issues.

Cambridge, Ma.

F. MODIGLIANI - T. JAPPELLI - M. PAGANO

Post-scriptum. When this paper was already in print, Prof. L. Spaventa brought to our attention and kindly supplied a newly published series for the stock of debt of the general government sector, that extends previously published data back to 1960 — thus eliminating the need of turning to estimates prior to 1975 — and even allows for a correction for the deposits held by the general government sector with the banking sector (Source: *L'indebitamento del settore pubblico in Italia: evoluzione, prospettive e problemi*, Rapporto della Quinta Commissione della Camera dei Deputati, 1985, Tavola 3). We have since reestimated all relevant regressions using the more reliable data, and have obtained results very close to those reported in Section 5 (the only appreciable difference is a higher and more significant coefficient on the debt variable in equation 1.3, .07 instead of .02).

DATA APPENDIX

1. *Consumption* (C_p): is defined as final consumption of the private sector. The variable includes expenditure on durables, although ideally one would like to include only the flow of services from durables over the relevant year. Italian statistics unfortunately do not provide a series for such a variable (Source: OECD, National Accounts).

2. *Wealth* (W): is defined as the sum of private sector capital and net financial assets held by households at the beginning of the year. Capital includes residential structures (but not consumer durables). Net financial assets include corporate equities, bonds, deposits, net worth of insurance policies, currency and government net debt. Corporate equities are reported at market value, but public debt is valued at face value. In what follows we provide information on how each component of the series has been defined or constructed:

2.1. Net Financial Wealth: includes all net financial assets held by households, except for equities. From 1964 to 1982, it is drawn from the flow of funds accounts published on the Annual Report of the Bank of Italy, Statistical Appendix (hereafter BI-SA). Before 1964, the series is assumed to be proportional to the financial assets of households and business sectors ("Attività finanziarie dell'economia", in BI-SA).

2.2. Equities: from 1950 to 1974 the Bank of Italy computed a series on the stock of equities held by the household and business sectors (gross of duplications) at market value by multiplying the face value of the total stock by a conversion index obtained as the ratio of market value and face value from a small sample of publicly quoted corporations (Source: BI-SA). In 1975 the sample was changed to include all corporations quoted on the Milan Stock Exchange, because it was realized that the old sample was inducing a downward bias in the estimated value of the total stock. The change in the method used to compute the series has induced a jump in the estimated stock of equities. For example, in 1975 the old series is 11,478 bn. lire, whereas the newly computed one is 27,275 bn. lire. In order to avoid the resulting spurious jump the old series has been rescaled, so as to have 27,275 bn. lire as terminal value. However, the series that has to be included in the wealth variable is that on the stock of equities held by households *alone*. A reliable series of this kind exists only from 1978 onwards (Source: BI-SA). For the years 1952-77 we have then assumed that equities held by households are a constant proportion of equities held by the household and business sector together — adjusted as explained above.

2.3. Debt (D): government debt includes the gross debt of the general government net of holdings of the foreign sector and of the central bank (Source: BI-SA). The latter has been excluded because in Italy central bank and general government accounts are not consolidated. Before 1974 the only published series on national debt was that on the debt of the central government, whereas from 1975 afterwards a series on total debt of the public sector is available. Since we were after total public debt held by the private sector we rescaled the series on central government debt, so that its 1975 value would be equal to the initial value of the new series on general government debt. The assumption is that the growth pattern of the (unobserved) public sector debt would be reasonably approximated by the series of central government debt. Other studies of the Italian national debt have used the central government series throughout (for example, Spaventa, 1984). We discarded this solution because starting in 1976 the central government has rapidly absorbed most debt previously issued by other administrations (especially local governments and public hospitals) inducing a spurious growth in the debt of the central government in 1976-77.

2.4. Residential buildings owned by households: from 1970 onwards the series has been kindly provided by E. Lecaldano of the Research Bureau of the Bank of Italy. For the years before 1970, the series has been constructed by using data on investment and depreciation of residential buildings at current prices and the implicit price deflator of investments in residential housing (Source: *Annuario italiano di statistica*, ISTAT), according to the following identity:

$$V_{t-1} = P_{t-1} H_{t-1} = V_t (P_{t-1}/P_t) - P_{t-1} (H_t - H_{t-1}) = V_t (P_{t-1}/P_t) - P_{t-1} I_{t-1} + P_{t-1} D_{t-1}$$

where:

V_t = period t housing stock at current prices;

H_t = period t housing stock in physical units;

P_{t-1}/P_t = implicit price deflator of residential housing;

I_t = physical investment in residential housing between period t−1 and period t;

D_{t-1} = physical depreciation of the stock between period t−1 and period t.

The above identity has been used recursively to derive V_{1969}, V_{1968}, etc. starting from the terminal value V_{1970}k

3. *Net national product* (NNP): includes retained earnings but not nominal interest payments from the general government to the private sector (Source: OECD, National Accounts).

4. *Net interest payments* (RD): these are the difference between interest paid and received by the general government (Source: Annuario di contabilità nazionale, ISTAT, for the period 1952-1980 and BI-SA for the years 1981-82). No adjustment has been made for interest paid by the government to the central bank (for a discussion on this point, see Spaventa, 1984).

5. *Taxes and government consumption*: direct taxes, indirect taxes, transfers and government consumption expenditure (C_g^n), are taken from the OECD, National Accounts, for the years 1963-82 and from the Annuario di contabilità nazionale, ISTAT, for the years 1952-62. Indirect taxes are net of subsidies, transfers do not include net transfers from the rest of the world.

6. *Exports*: Source: OECD, National Accounts.

7. *Deflator of private consumption expenditure*: Source: OECD, National Accounts.

8. *Interest rate*: medium term government bond yield (Source: IMF, row 61b).

9. *Lira/Dollar exchange rate*: Source: IMF, row ae.

10. *Population*: mid-year estimates (Source: United Nations Demographic Yearbook). The series has not been updated with census data.

All variables used in the regressions are deflated and normalized by population. In Table 5 we present all the most important series used in the estimation in bn. lire at 1970 prices, the deflator of private consumption and population (in thousands), for the period 1952-82. Wealth (W) and debt (D) are beginning-of-period values, *i.e.* correspond to previous year values in the sources. Current account deficit ($DEF^m - pD$) is not exactly equal to ($C_g^n + RD - T$), as implied by identity (5), because the reported deficit includes some additional minor items, *i.e.* net transfers from the rest of the world and net property income received by the general government.

TABLE 5

DATA SET USED IN THE ESTIMATION

	C	NNP	T	W	D	RD	DEF^m-pD	C_g^m	Deflator	Population
1952	14281.2	17909.8	2357.4	55665.3	6869.9	234.7	– 24.0	2420.8	1.71	47666
1953	15167.1	19500.3	2606.3	62531.1	7835.6	227.8	– 314.9	2482.3	1.68	47957
1954	15400.4	20339.1	2977.3	63492.5	8608.1	309.2	– 387.7	2696.0	1.64	48299
1955	16051.1	21844.2	3039.6	66554.2	9218.8	325.7	– 379.7	2820.3	1.59	48633
1956	16812.8	22724.6	3321.6	68052.3	9668.9	350.5	– 613.0	2945.3	1.52	48920
1957	17505.7	23941.6	3530.7	71023.2	10183.1	343.4	– 792.7	3075.4	1.49	49181
1958	18200.5	25199.7	3615.0	72644.4	10342.5	315.5	– 648.5	3299.5	1.46	49475
1959	19107.7	26939.6	3948.3	76866.0	11439.0	410.3	– 650.0	3552.7	1.47	48831
1960	20684.0	28884.5	4444.1	84056.4	12717.1	438.2	– 877.8	3805.7	1.45	50198
1961	22706.9	33926.9	5284.8	90931.6	12642.2	455.0	–1018.4	4667.2	1.43	50523
1962	24329.1	36184.3	5752.2	93424.8	12740.7	450.9	–1016.9	5128.0	1.35	50843
1963	26584.4	38679.4	6167.7	96351.2	12542.7	408.6	– 829.8	5836.2	1.26	51198
1964	27466.1	40236.0	7447.6	101908.1	12152.6	397.8	–1064.5	6284.3	1.21	51600
1965	28362.0	41874.9	6762.8	107834.1	12390.8	435.3	249.1	6885.1	1.16	51987
1966	30393.4	44239.1	6902.5	113349.9	13835.5	514.6	309.9	7126.4	1.13	52332
1967	32636.5	47320.6	8020.2	117721.5	15931.8	583.3	– 517.5	7374.4	1.10	52667
1968	34325.2	50628.6	8546.2	124627.4	16449.3	704.6	– 312.3	7922.6	1.08	52987
1969	36586.9	54328.9	8689.4	131260.3	18056.1	772.9	– 71.4	8345.9	1.05	53317
1970	39371.0	57995.0	9054.0	143242.0	18139.0	633.0	– 116.0	8664.0	1.00	53661
1971	40526.5	59738.9	8843.0	154304.2	18277.3	803.5	1308.5	10051.1	0.95	54005
1972	41903.1	61459.9	8225.5	160066.3	21516.5	1024.0	2771.8	10753.4	0.89	54411
1973	44366.7	65019.8	8763.2	171008.8	23628.0	1240.9	2804.7	11006.0	0.79	54912
1974	45534.2	65443.4	9238.3	196911.5	22635.2	1614.0	2756.1	10939.3	0.65	55413
1975	44821.6	62053.0	7536.8	196890.1	21857.0	2302.0	4929.9	10771.1	0.56	55830
1976	46359.1	65786.4	9331.4	206443.5	23819.9	2837.8	3771.3	10895.6	0.47	56168
1977	47014.6	67464.4	10867.5	211703.1	23263.2	3204.7	3233.8	11552.9	0.40	56461
1978	48295.7	70118.1	11309.4	213120.9	29223.8	4020.7	4455.2	12445.7	0.35	56710
1979	50674.8	74366.5	12106.7	221702.1	34088.5	4152.7	4435.2	13461.1	0.31	56910
1980	53120.0	77683.3	14059.1	229534.6	36104.5	4650.0	3472.2	14192.7	0.26	57070
1981	53647.2	76053.0	14259.1	252016.7	36208.1	5476.6	6351.2	15651.6	0.21	57200
1982	53677.3	76305.4	14579.6	252861.4	37883.2	6644.5	7433.1	15915.1	0.18	57330

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