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Non marketable assets and households' portfolio choices: a case study of Italy

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NON MARKETABLE ASSETS AND HOUSEHOLDS' PORTFOLIO CHOICES: A CASE STUDY OF ITALY

by

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Abstract: *This paper analyzes the determinants of aggregate households portfolio choices conditional on those components of wealth which can be regarded as highly or totally illiquid because of the existence of substantial transaction costs and/or institutional constraints on agents behaviour. The empirical analysis broadly confirms the importance of the above-mentioned institutional aspects in the allocation of financial wealth and provides the means for addressing some interesting questions regarding the behavior of portfolio holders in financial markets. In particular, it is shown that the presence of non-tradable assets changes the risk premia on marketable assets. Hence, in cases such as the Italian one, where the State is both the issuer of government securities and the collector of social security funds, the positive correlation (due to a common default risk) between returns on government securities and on non-marketable assets could lead to a higher cost of public debt financing.*

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1. Introduction[1]

The role of non marketable assets in the allocation of financial savings has been long recognized in the finance literature. Mayers (1972, 1973), Brito (1977,1978), Stapelton and Subrahmanyan (1979), among others, have analyzed the role of non-marketable assets in a static Capital Asset Pricing Model. More recently, Svensson and Werner (1990) have studied the same issue in the dynamic framework of a Consumption CAPM.

In principle, the presence of non-marketable wealth affects the portfolio composition since agents are more willing to hold financial assets whose returns are less correlated with the (unobservable) returns of illiquid assets. The extension of traditional portfolio analysis to the case of non-marketable assets can therefore help explaining the observed highly differentiated structure of households portfolios. It is not surprising, therefore, that empirical applications have been (successfully) confined to the analysis of microdata which better capture the quantity constraints faced by different individuals [Dicks-Mireaux and King (1982), Hubbard (1985)].

However, it could be argued that the effects of non-marketable assets on portfolio choice should also be empirically traced at the aggregate level where non marketable assets could be expected to show up as important determinants of equilibrium rate of returns. In this spirit, the present paper attempts to provide the aggregate counterpart to the already existing microeconomic evidence by focusing on the determinants of aggregate households portfolio choices conditional on those components of wealth which are highly or totally illiquid due to the existence of substantial transaction costs or institutional constraints on agents behaviour.[2]

In this respect Italy provides an ideal case study in that around 80 percent of households real and financial wealth can be considered as partially or totally non marketable. On the one hand, social security wealth, arising from mandatory participation in pension schemes, accounts for one third of total household wealth. On the other hand, extensive rent controls characterize the rental market while, at the same time, the market for houses operates imperfectly due to substantial transaction costs.[3] Hence, real wealth (almost entirely made up by housing equity) can be regarded as a largely illiquid asset.

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2. In principle, the most important form of non marketable asset is, no doubt, human wealth. The empirical evidence on its role is, however, far from clear cut [Fama and Schwert (1977)].

3. Some of these transaction costs are directly linked to the existing imperfections in credit markets. See Jappelli and Pagano (1989).

The paper is organized as follows. In Section 2 we extend Hubbard's (1985) model to more than one non-marketable asset. The theoretical framework is given by the standard hypothesis of mean-variance optimization which the recent, seminal work of Grossman and Laroque (1990) has proved to be an optimal consumer strategy in the presence of illiquid durable consumption goods (such as houses). The theoretical model is introduced firstly for the individual investor and then at an aggregate level, where we take up Grossman and Laroque (1990) suggestion and let aggregate risk aversion depend on the age distribution of house ownership.

In Section 3 estimation and hypothesis testing takes place on yearly observations over the period 1970-1988 while, in Section 4, the estimated asset demand system is used to answer some questions regarding the behaviour of portfolio holders in financial markets. Some of these questions, although being explored in the U. S. literature, have not been addressed thoroughly elsewhere, notwithstanding their general importance. We refer, for example, to the question, discussed by Frankel (1985) for the United States, of portfolio crowding out, i.e. the possibility that a growing public debt might raise the equilibrium yield on capital. We also relate to the so-called Ricardian equivalence proposition which, in the present context, implies that returns on government securities be totally inelastic with respect to growing deficits financed with bonds.

With respect to both issues, Italy provides, once more, a particularly interesting case: between the middle of the 1970s and the end of the 1980s Italian public debt grew from 50 percent to almost 100 percent of GDP with an increasing share of this debt being financed at rising market rates. However, apart from allowing an assessment of the effects of increasing deficits, the present theoretical framework lends itself to other, noteworthy exercises. In particular, it has been recently suggested [Alesina, Prati, and Tabellini (1990) and Cottarelli and Mecagni (1990)] that the high Italian interest rates could embody a "risk premium" should the government unilaterally change, ex post, the terms under which its debt had been issued. The present paper provides indirect evidence on this important topic since the theoretical model implies that equilibrium relative returns can depend on the correlation between government securities and non-marketable assets returns. In the Italian case where the issuer of government securities is also the social security funds collector, the positive correlation (due to a common default risk) between returns on government securities and on non-marketable assets could lead to financing at higher costs for the Treasury.

2. The Theoretical Framework

In traditional portfolio models, it is well known [Merton (1969), (1971), (1973)] that, under the assumption of constant relative risk aversion and joint-normally distributed expected asset re-

turns, expected utility maximization in continuous time subject to a wealth constraint yields a system of assets demand equations in share form depending (linearly) on expected returns according to the variance-covariance structure of assets returns, as follows:

[2.1] $$s^h = (1/\rho^h)AE(r)+B$$

where s^h and r indicate, respectively, the $(nx1)$ vectors of optimal asset shares (relative to total marketable wealth) held by the $h-th$ household and real after tax rates of return on (n) risky assets which are assumed to be equal among agents. The scalar ρ^h indicates the degree of (constant) relative risk aversion, $E(.)$ represents the mathematical expectation operator and it is assumed that all assets are risky and marketable. In [2.1]:

[2.2] $$A = \Omega^{-1} - (i'\Omega^{-1}i)^{-1}\Omega^{-1}ii'\Omega^{-1} \qquad (nxn)$$

and

[2.3] $$B = (i'\Omega^{-1}i)^{-1}\Omega^{-1}i \qquad (nx1)$$

where Ω denotes the (nxn) variance-covariance matrix of asset returns and i is the $(nx1)$ unit vector.

A typical feature of most European economies, and in particular of the Italian one, is the existence of future monetary claims such as social security payments. The mandatory participation in a social security system is an extreme example of illiquid assets in households portfolios but a similar situation can arise if large transaction costs prevent disposal of, say, the housing stock. In such a case, a system of asset demand [2.1] remains valid but returns on market assets need to be adjusted for the existence of illiquid assets and the matrices A and B need to be modified accordingly. Formally, let r^+ represent the $(nx1)$ vector of after tax real returns on marketable assets and r^- the $(mx1)$ vector of (unobservable) non-marketable asset real net returns. Accordingly, let Ω^+ be the (nxn) variance-covariance matrix of marketable asset returns and Ω^- be the (nxm) matrix of covariances between marketable and non-marketable asset returns. Finally, let s^{+h} and s^{-h} represent the vectors ($(nx1)$ and $(mx1)$ respectively) of the ratios of marketable and non-marketable asset holdings relative to total marketable wealth.

As Mayers (1973) and Hubbard (1985) have shown:

[2.4] $$s^{+h} = (1/\rho^h)A^+[E(r^+) - \rho^h\Omega^-(s^{-h})] + B^+$$

$$= (1/\rho^h)A^+ \; E(r^+) + C^+s^{-h} + B^+$$

with:

[2.5] $$A^{+} = (\Omega^{+})^{-1} - [i'(\Omega^{+})^{-1} i]^{-1} (\Omega^{+})^{-1} ii'(\Omega^{+})^{-1} \qquad (nxn)$$

[2.6] $$B^{+} = [i'(\Omega^{+})^{-1} i]^{-1} (\Omega^{+})^{-1} i \qquad (nx1)$$

and

[2.7] $$C^{+} = -A^{+}\Omega^{-} \qquad (nxm)$$

where i once again indicates the unit vector of appropriate dimension. The demand system [2.4] represents a straightforward extension of Hubbard's (1985) one to the case of multiple non-marketable assets. Equation [2.4] underlines the fact that, in the presence of non-marketable wealth, investors tend to diversify away their portfolios from stocks with which their non-marketable assets are most highly correlated. In other words, individual investors require different risk premia, attaching relatively higher premia to those marketable assets with which their non-marketable returns show the highest covariance.

Non-marketable assets are not necessarily equally distributed among investors. Neverthless, if investors share the same expectations and preferences are homogeneous, aggregation among agents is allowed for by the linearity of [2.4]. This homogeneity, however, seems to be anything but a remote possibility in light of the micro-economic information available. Therefore, in order to introduce a specific source of heterogeneity, let us assume that individual investors differ in the (constant) degree of relative risk aversion.[4]

In such a case, the system [2.4] would be replaced by the following aggregate asset demand system:

[2.8] $$s^{+} = (1/\rho)A^{+} \; [E(r^{+}) - \rho\Omega^{-}(s^{-})] + B^{+}$$

$$= (1/\rho)A^{+}E(r^{+}) + C^{+}s^{-} + B^{+}$$

where if A^{h} represents total marketable assets held by the $n-th$ household,

[2.9] $$s_i^{+} = \sum_{h=1}^{H} \left(A^{h} / \sum_{h=1}^{H} A^{h} \right) s_i^{+h}$$

4. At the theoretical level Grossman and Laroque (1990) have forcefully suggested the existence of a direct relationship between transaction costs and risk aversion.

[2.10] $$s_i^- = \sum_{h=1}^{H}\left(A^h / \sum_{h=1}^{H} A^h\right) s_i^{-h}$$

and

[2.11] $$(1/\rho) = \sum_{h=1}^{H}\left(A^h / \sum_{h=1}^{H} A^h\right)(1/\rho^h)$$

Eq. [2.11] introduces a weighted index of the distribution of all households risk aversions, with weights given by the respective amounts of marketable assets. Obviously, if the distribution of marketable assets shifts over time, the demand system [2.9] becomes a varying parameter model. It is worth noting that Nelson and Kim (1988) have recently suggested that time-varying parameter models can often constitute a valid alternative to models featuring auto-regressive conditional heteroscedasticity.

3. Estimation and Hypothesis Testing

The present study focuses on six assets which are considered to be freely traded on the market[5]: bank deposits[6], deposits with other financial intermediaries[7], government securities[8], private bonds[9], equities[10] and foreign assets[11]. Pension wealth as well as real wealth is considered instead as a non-marketable asset. The latter includes an estimate of the housing stock, land, and durable goods. Pension wealth includes social security, underwriting reserves and employment termination allowances. Naturally, it is not intended that pension assets are perfectly and entirely illiquid. It is clear in fact that, in certain cases, the choice of a different occupational sector could allow for getting out of a pension fund. Though explicit and implicit transaction costs may be extremely high (at least for U.S. or U.K. standards), it is likewise clear that, in principle, it is

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5. Therefore, the analysis focuses on financial assets with the exclusion of financial liabilities. As far as long term financial liabilities are concerned, it is assumed that quantitative constraints inflence (as in Italy) households propensity to save. The availability of short term debt should instead impinge on the holdings of liquid assets (cash) which are not taken into consideration in the present work.
6. Includes time and sight deposits and bank acceptances. It does not include currency which is presumed to be required by households for transaction purposes. It should be recalled that in Italy time deposits are interest bearing assets.
7. Includes Post Office deposits and deposits with special credit institutions.
8. Includes Treasury bills, credit certificates of the Treasury, public agencies bonds, local government bonds, other government bonds and investment trusts holdings of government bonds. Italian financial accounts do not provide market values for these assets.
9. Includes corporate bonds and bonds of special credit institutions. Italian financial accounts do not provide market values for these assets.
10. Includes stocks and investment trusts holdings of stocks, all at market value.
11. Includes foreign bonds and investment trusts holdings of foreign assets.

not possible to consider the housing stock as a non-marketable asset. It is worth exploring, though, the possibility that the present set of assumptions about relative asset marketability could actually turn out to be the most appropriate one.

The sample period extends from 1970 to 1988 and the frequency of observations is annual.[12] In other words, the information on the whole is limited and this calls for a prudent evaluation of the results which follow.

The first step towards the understanding of the determinants of financial wealth allocation is a brief description of the composition of Italian households portfolios over the period 1970-1988 (Figure 1).[13] As of the end of 1988, real wealth was about one half of Italian households total wealth. In the same period, housing equity represented more than 80% of households' real assets while durable goods and land property reached, respectively, 3 and 14 percent.

Financial assets instead represented a little more than 20 percent of households wealth at the end of 1988. In the two decades, their composition appears to be largely dominated by (i) the heavy process of disintermediation experienced by banks beginning at the end of the 1970s and contributing to halve the share of banking deposits in households financial portfolios, and (ii) the unprecedented growth of government securities weight, reflecting the growing government deficit and the low degree of its money financing.

At the end of 1988, pension wealth accounted for one third of total households assets and its share, after a abrupt drop off in 1973, has steadily increased over time.

Finally, Figure 2 proposes a different key to interpreting the composition of financial households portfolios (which include pension wealth), by reclassifying the various assets by issuer. The figure shows that at the end of 1988, Italian households had lent more than 75 percent of their financial savings to a single agent (the government), in the form of currency, Post Office deposits, government and state - guaranteed securities and social security. The remaining 25 percent was instead allocated among the banking system (roughly 14 percent), companies (10 percent), and foreign holdings (just one percent). It is interesting to note that the government share had reached a minimum (equal to about 62 percent) in 1973 and has thereafter grown to 75 percent in 1981 where it has remained since.

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12. The length of the sample period was dictated by the available Financial Accounts. A Data Appendix, available on request from the authors, provides a detailed list of the statistical sources and, where necessary, the methodologies used to reconstruct the full data set. This Appendix witnesses the many problems which had to be faced in organising a homogeneous data base.

13. It should be recalled that the household sector in Italy includes family-run companies. In official statistics, households are considered a residual group where all errors and omissions pile up.

FIG.1 - COMPOSITION OF HOUSEHOLDS TOTAL WEALTH

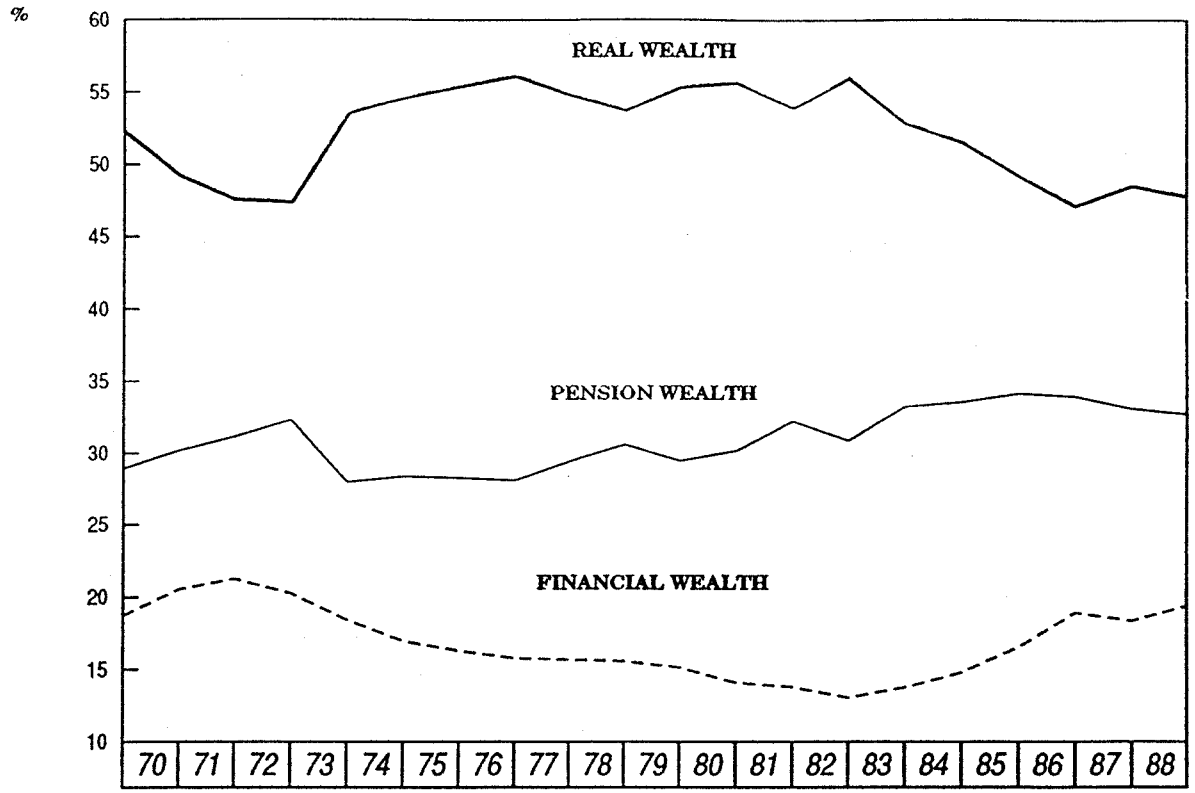
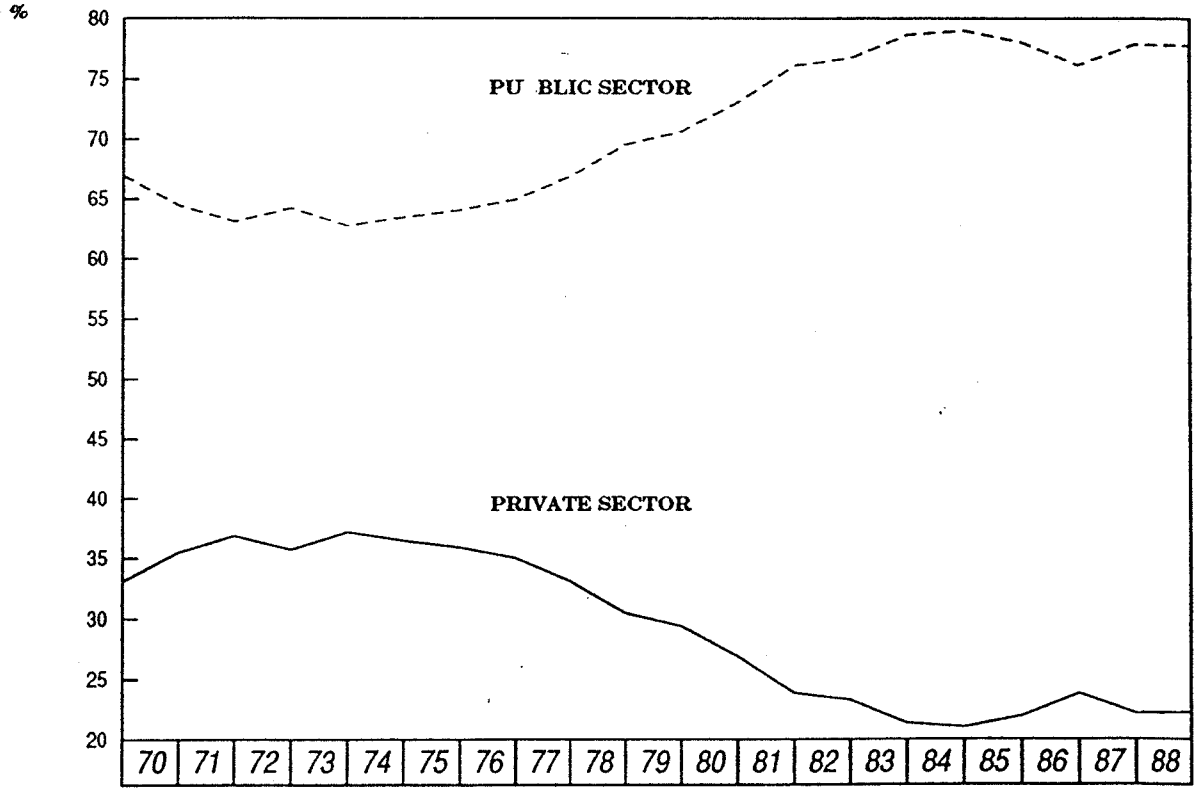


FIG.2 - COMPOSITION OF HOUSEHOLDS FINANCIAL AND SOCIAL SECURITY WEALTH: BREAKDOWN BY TYPE OF ISSUER



As far as rate of returns are concerned, it should be underlined that all rates are net of taxes, even though it was impossible to arrive at an estimate of marginal tax rates. The return on equities and foreign assets was defined to include capital gains or losses. Finally, real returns are computed dividing one plus the nominal return by one plus the inflation rate. Therefore they take into account the usually neglected convexity term.

As in Frankel (1985), estimation is based on the following system of inverse demand:

[3.1] $$E[r^+] = \rho[(A^+)^{-1}s^+ + \Omega^-(s^-) - (A^+)^{-1}B^+]$$

where r^+ (a vector of dimension $((n-1)x1)$) now defines the expected real returns on assets other than bank deposits, each measured relative to the expected real return on the reference asset, bank deposits. It is assumed that financial markets remained in equilibrium throughout the sample period and that therefore returns were such as to induce investors to hold portfolios in the proportions observed. With respect to the equation [2.4], the inverse demand system [3.1] allows the advantage of considerably simplifying the estimation stage. If expectations are rational,

[3.2] $$r^+_{t+1} = E(r^+_{t+1}) + \varepsilon_{t+1}$$

and

[3.3] $$E_t(\varepsilon_{t+1} \mid I_t) = 0$$

and therefore the system, [3.1] can be rewritten as:

[3.4] $$\hat{r}_{t+1} = \rho\left[(A^+)^{-1}s^+_t + \Omega^-(s^-_t) - (A^+)^{-1}B^+\right] + \varepsilon_{t+1}$$

whose error term is orthogonal with respect to the information set available to agents at time $t(I_t)$. Seemingly unrelated regression equations methods are therefore applicable.[14]

In estimating the system (3.4), the time varying risk aversion coefficient was taken to depend linearly on the (deviations from the sample mean of the) share of labour force of age 14 to 39. Grossman and Laroque (1990) have shown that, in the presence of transaction costs, investors become more risk averse after the purchase of durable goods which occurs infrequently. Since individual data[15] show that the majority of the population buys a house (certainly the most

14. Of course, this possibility relies on the absence of measurement errors.

15. See, in particular, the annual survey on households savings and wealth conducted by the Bank of Italy.

important of durables) between the age of 35 and 40, it is conceivable that risk aversion may rise with age. To put it differently, the underlying assumption is that of a negative relationship between average risk aversion and the share of investors of age below 40:

[3.5] $$\rho = g_0 + g_1 d$$

where d is the (deviation from the sample mean of the) share of the population of age 14 to 39; g_0 and g_1 are the parameters to be estimated ($g_1 < 0$).

In principle, the additional information contained in the age distribution of the population should allow the estimation of the relative risk aversion coefficient which, constant for each individual investor, is instead variable in the aggregate. Unfortunately, it proved impossible to obtain an independent estimate of the parameters g_0 and g_1. Therefore, in the analysis which follows, reference will be made to estimates conditional on the value of $\hat{g}_0 = 0.50$ to which corresponds an average risk aversion very close to values which generally are believed to be reasonable.[16]

Table 1 reports the sequence of specification and misspecification tests applied to the system [3.4]. In particular, the table reports the LR statistics ($\Psi(q)$) testing, for the whole system, the hypothesis of residual autocorrelation.[17] The subsequent statistics tests instead the hypothesis of structural stability of the parameters with reference to the following sub-samples: 1988 and 1987-1988.[18] In the lower section of Table 1, several tests of specification are reported which are of particular interest in the present context; these will be commented upon below.

In light of the results contained in the upper part of Table 1, the performance of the model is noteworthy. If the statistics $\Psi(q)$ are modified to take into account their finite samples bias [Meisner (1979) and Bewley (1983)][19], there are no apparent signs of dynamic misspecification.[20] Undoubtedly, adjustments for small samples have an arbitrary nature [Sargan and Sylwestrowicz

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16. The likelihood function turned out to be virtually flat for a wide range of values of g_0 and g_1. Neverthless, the corresponding estimate of the aggregate relative risk aversion turned out to be rather stable as well as precisely estimated.

17. The test is a multivariate extension of the well-known LM test of dynamic specification [Godfrey (1988)].

18. The test is a multivariate extension of the well-known Chow test [Anderson and Mizon (1983)].

19. This is true if the adjustment conforms to Pudney's (1981, p.575) suggestion, i.e.

$$\Psi^* = \Psi + (I-1)T \ln[((I-1)T - k_1)/((I-L)T - k_0)]$$

(where k is the number of parameters and the subscripts "0" and "1" indicate respectively, the null and alternatives hyphoteses) or instead to Meisner's (1979) one:

$$\Psi^{**} = \Psi(T - k_1/(I-1))/T].$$

20. This finding is of particular interest especially when compared with the results obtained by Stoker (1986). As in that paper, allowing for distributional effects turns out to be a theoretically plausible substitute for ad hoc dynamic effects.

(1976)]. Neverthless, in the light of the problems characterizing small samples, the adjustment of asymptotic statistics is essentially intended as part of a broader sensitivity exercise aimed at evaluating the overall robustness of empirical results. We should note in particular the positive indication contained in the structural stability tests. With regard instead to the specification analysis, the superiority of the present version of the model over the traditional version is apparent. Both non-marketable assets and the distributive variable contribute to explaining (also individually) the trend in the composition of households portfolios.

Table 1 - Specification Tests

	$\Psi(q)$	$\Psi^*(q)$	$\Psi^{**}(q)$	q
System autocorrelation test	50.9	19.6	33.9	25
System structural stability test:				
1988	6.5	-	4.3	5
1987 - 1988	33.5	-	21.9	10
Specification tests:				
$g_i = 0(\forall_i)$	15.2	13.7	10.0	1
$\omega_{ij} = 0(\forall_{i,j})$	57.2	43.4	37.5	10
$g_i = \omega_{ij} = 0(\forall_{ij})$	65.9	50.8	43.2	11
Wald test of mean-variance optimisation	2464.7	-	-	15

Note: $\Psi(q)$ denotes the likelihood ratio statistic and $\Psi^*(q)$ and $\Psi^{**}(q)$ denote its counterparts adjusted for small sample bias as in Pudney (1981, p. 575) and Meisner (1979), respectively. All statistics are distributed as χ_q under the null.

As in Frankel (1985), implicit restrictions in the mean-variance optimization are clearly rejected. Reference is made here to the well known fact that, within the theoretical context of the present paper and given previous assumptions about the process of expectation formation, the coefficients of the $(A^+)^{-1}$ matrix (that is, the elements of the variance - covariance matrix of asset returns) should correspond to the elements of the residual variance - covariance matrix. The statistics reported in Table 1 tests, on the basis of the unconstrained estimates,[21] the previous proposition and rejects it firmly. As it is known, several reasons can account for this result. In fact, the null hypothesis incorporates not only the assumption of mean-variance optimization but also a host of additional hypotheses on the nature of expectations as well as on the stochastic properties of omitted variables and on the absence of measurement errors.

21. The use of a Wald type test in the mean-variance model has been suggested by Engel and Rodrigues (1988).

Table 2 - Parameter Estimates of the Inverted Assets Demand System

DEPENDENT VARIABLE $\hat{r}^+$	EXPLANATORY VARIABLES								
	$(A^+)^{-1}$ Matrix					$-\Omega^-$Matrix		$-(A^+)^{-1}B^{+1}$Matrix	
	Post Office Deposits	Govern. Securities	Private Bonds	Equities	Foreign Assets	Pension Wealth	Real Wealth		Adjusted R^2
Post Office Deposits	3.19 (0.37)	0.39 (0.05)	-0.53 (0.09)	0.37 (0.09)	-1.64 (0.64)	-0.02 (0.01)	-0.03 (0.01)	-0.32 (0.06)	O.93
Government Securities		0.53 (0.11)	0.17 (0.13)	0.90 (0.15)	2.48 (1.11)	0.03 (0.03)	0.05 (0.02)	-0.41 (0.03)	0.86
Private Bonds			-0.08 (0.24)	0.35 (0.21)	2.66 (1.20)	0.07 (0.03)	0.01 (0.01)	-0.07 (0.05)	0.75
Equities				10.98 (26.61)	13.41 (8.24)	4.26 (3.28)	-0.07 (1.79)	8.23 (7.48)	0.18
Foreign Assets					134.49 (58.29)	-1.62 (1.72)	2.21 (0.79)	-6.26 (2.57)	0.35
Log-likelihood function: 191.001									
$\rho = 0.50 - 15.90(1.42)d$									
In parentheses, heteroscedasticity consistent standard errors.									

On the basis of the results in Table 1, Table 2 reports the estimates of the parameters of the model [3.4]. Contrary to the previous literature, [Frankel 1985)], the estimates are undoubtedly rather precise as well as plausible, in particular as far as the matrix $(A^{+})^{-1}$ is concerned. This is not necessarily surprising. If non-marketable assets are important determinants of households portfolio choices (as Table 2 suggests to be the case), previous estimates of the substitution matrix could be regarded as biased and inconsistent.

A quick loook at the rate of return response matrix $(A^{+})^{-1}$ indicates that expected returns on four out of five assets turn out to depend positively on their own supplies. The only exception is given by the expected return on corporate bonds whose response to increases in its own supply appears to be negative, altough not significantly different from zero.[22] The size of estimated own supply responses largely corresponds to prior beliefs. For example, a one percent increase in the share of government securities (corresponding to 12.5 billions of Italian lire or, approximately, one thent of the current Italian government deficit) would lead, *coeteris paribus*, to slighly more than half percent increase in their expected relative returns (on an annual basis). A one percent increase in the share of foreign assets (that is a 75 percent increase in their 1988 stock) would, instead, be consistent with a substantial devaluation of the Italian lira (on a monthly basis). As far as the off-diagonal elements are concerned, some of them forcefully suggest that the common assumption of gross substitutability (generally regarded as plausible by most of the empirical literature) is clearly rejected by the data.[23] For example, deposits with other financial intermediaries (mainly Post Office deposits) appear to be complements of stocks and government securities while they show up as close substitutes of private bonds and foreign assets.

In the present context, the main event is given, however, by the effects of non-marketable assets on portfolio composition. Table 2 indicates that the effects of pension wealth on deposits with other financial intermediaries, private bonds and equities are particularly relevant. An increase in pension wealth causes a reduction in the expected return of non-bank deposits, i.e. a reduction of the risk premium on assets which are considered somewhat different from the pension assets. A larger pension wealth seems instead to cause an increase in the relative return on government securities and private bonds whose returns are regarded as positively correlated with the (unobservable) return on social security wealth. As far as real wealth is concerned, its impact

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22. This result is mot entirely surprising and witnesses the long lasting difficultis of the Italian private bond market. It should be underlined that, if the relevant parameter is set to zero, none of the results of the paper turns out to be affected.

23. This is not surprising in the light of the cogent assumptions required by gross substitutability [Blanchard and Plantes (1977)].

is negative on the expected return of deposits with other financial intermediaries (which command a higher degree of liquidity) and positive on the expected returns of government bonds and foreign assets. Along with real assets, foreign assets possibly provide (through their indexation to exchange rates) a valid protection against inflation risks if it is believed that purchasing power parity holds in the long run.

Finally, notice that the empirical evidence seems to support the hypothesis of a progressive reduction in the risk aversion coefficient due to the changing age pattern of the work force. The estimated coefficient $\hat{g}_1$ is, as expected, negative and strongly significant. As a result, conditional on $g_0 = 0.5$, the degree of relative risk aversion decreases from a value of 0.65 (with an asymptotic standard errors of 0.01) in 1970 to 0.24 (0.02) in 1988.

4. Portfolio Crowding Out/In Effects

The estimates presented in Table 2 can be used to test a set of propositions concerning the response of expected rate of returns to increases or decreases in relative asset supplies.[24] Among them is the so-called "portfolio crowding in/out" that is the question of whether government debt drives up the rate of return on capital and thus crowds out private investment [Frankel (1985)].

Starting with own supply responses, Table 3 shows that, in the ending year of the sample (1988), an increase in the supply of deposits with other financial intermediaries (postal deposits) and of government securities raised significantly the expected rate of returns on these assets. This result contrasts with the so-called Ricardian equivalence proposition which assumes a total rigidity of the interest rate on government securities with respect to growing public deficits.

Moreover, an increase in the supply of government securities does not appear to significantly affect either the rate of return on private bonds or that on equities. So there seems to be little evidence that a greater public debt could crowd out private investment by driving up the rate of return on capital.

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24. For instance, the effect of an increase in the supply of government bonds on the return on equities would be given by:

$$\frac{\partial E(r_i^+)}{\partial x_j} = \left(-\sum_k s_{ik}^* a_{ik}^* + a_{ij}^*\right)/A$$

where in addition to the known symbols, $E(r_i^+)$ is the expected yield on equities, x_j indicates the outstanding stock of government securities; a_{ik}^* is the element of the i-th row and the k-th column of the matrix$(A^+)^{-1}$; A is total marketable wealth.

For bank deposits, whose share in households portfolios has decreased in favour of government securities, it is not possible to assess the effect of an increase in the supply of government securities on the their yield. However, Table 3 reports the impact of an increase in bank deposits supply on the returns of other assets.[25] This derivative turns out to be negative and significant for Post Office deposits, government and corporate bonds. It is negative but insignificantly different from zero for equities. This can be explained by the fact that banking deposits represent the most important component in the money supply. An increase in the latter coincides with an expansionary monetary policy and a reduction of interest rates.

Table 3 - Crowding-Out/In Effects

	Supply					
Expected Rate of Return	Post Office Deposits	Govern. Securities	Private Bonds	Equities	Foreign Assets	Bank Deposits
Post Office Deposits	0.217	-0.008	-0.082	-0.010	-0.171	-0.039
	(0.025)	(0.003)	(0.010)	(0.005)	(0.054)	(0.004)
Government Securities	0.000	0.011	-0.018	0.040	0.167	-0.032
	(0.005)	(0.006)	(0.008)	(0.014)	(0.088)	(0.004)
Private Bonds	-0.049	0.007	-0.013	0.021	0.207	-0.007
	(0.008)	(0.008)	(0.018)	(0.019)	(0.097)	(0.003)
Equities	-0.116	-0.073	-0.118	0.737	0.932	-0.146
	(0.243)	(0.244)	(0.243)	(1.898)	(0.542)	(0.240)
Foreign Assets	-0.472	-0.141	-0.127	0.737	10.469	-0.340
	(0.100)	(0.101)	(0.110)	(0.612)	(4.643)	(0.089)
All figures are multiplied by 100.						
In parentheses, heteroscedasticity consistent standard errors.						

Assessing the magnitude of the derivatives of expected rates of return with respect to asset supply is, however, only one of the exercises that could be undertaken in the present setting. As shown in Section 2, with non-marketable assets, investors tend to shift the composition of their portfolios to assets whose yields are less correlated to illiquid assets. Therefore, the existence of non-traded assets changes the risk premium for each marketable asset.

In equation [2.8], the correction factor $(-\rho\Omega^{-}(s^{-}))$ is clearly seen to depend on three elements: the risk aversion coefficient (ρ), the estimated variance-covariance matrix between yields on marketable and non-marketable assets (Ω^{-}), and, finally, the share of illiquid assets with respect to total marketable wealth (s^{-}). Notice that the sign of the correction is given by the second element. Relatively higher premia will be required on marketable assets whose return are expected to positively covary with the returns on non marketable assets.

25. Since the equation of bank deposits has been omitted, the methodology of calculating portfolio crowding out for this asset is slightly different from that used for other assets (Frankel 1985).

Notwithstanding their far-reaching implications, the existing empirical literature has never provided an estimate of the adjustment factors. On the basis of the parameter estimates presented in Table 2, the following conclusions can be easily drawn.

The adjusted yields on Post Office deposits turns out to be substantially higher than the actual ones due to the negative correlation of their returns with those of real and pension wealth. In particular, the pension wealth component of the adjustment factor is estimated, in 1988, as 0.007 (with an asymptotic standard error of 0.004) while the real wealth component turns to be 0.016 (0.004). In other words, the adjusted returns on Post Office deposits turns out to exceed to the actual return (6.81 percent) by 2.3 (0.3) percentage points.

The opposite situation characterizes government and corporate bonds whose returns sharply decrease when taking account of their correlation with pension wealth. Government bonds present a total adjustment factor of -4.6 (0.9) percentage points, of which -1.4 (1.4) can be iputed to pension wealth and -3.2 (1.1) to real wealth. The adjustment factor pertaining to corporate bonds reaches -3.2 (0.9) percentage points (of them -2.7 (1.2) derive from the presence of pension wealth).

Therefore, in general, the estimates show that non-marketable wealth affects the risk premium on each market asset, even though the correction factors are sometimes hardly significant, as for equities and (partially) foreign assets. As far as the latter are concerned, pension wealth and the housing stock have oppposite effects (positive and insignificant the first one, negative and significant the second). This result may be explained by the low correlation between foreign assets and social security, which is scarcely indexed, and the high correlation between foreign assets and the housing stock. Indeed, the latter provides a sort of hedging against inflation risk similar to that granted by foreign currency denominated assets.

It is possible to observe the evolution of the adjusted yields just described over the sample period. The adjusting factors (whose dynamics is not reported here) have been reducing because the estimated coefficient of households risk aversion has decreased, balancing the effect of the increase in the weight of pension wealth.

5. Conclusion

The role of non marketable assets in the allocation of savings has been long recognized in the literature. However, the available empirical evidence on the role of non marketable assets is confined to the analysis of individual portfolios. This is in most respect unfortunate, since, as this paper has tried to show, the aggregate effects of non marketable assets (most notably social security wealth) could be far from negligible.

In particular, the paper provides an interpretation of the evolution of Italian households financial portfolios over the period 1970-88 by focusing on two specific features of the Italian case: (i) the illiquid assets make up about 80% of households total wealth; (ii) over one third of this 80% could be attributed to social security wealth arising from mandatory participation to pension schemes. Estimation of an asset demand system incorporating non-marketable and partially illiquid assets turns out to be a major improvement at the empirical level and offers elements to answer some interesting questions of general interest.

In summary, *portfolio crowding out*, (i.e. the increase in the rate of return on private capital induced by the increased supply of government securities) does not seem to have occured. Furthermore, an increase in the supply of government bonds brings about a rise in their yield, in contrast with the so called *tax discounting* hypothesis. Finally, the existence of non-marketable assets has been shown to affect the risk premia of all freely traded assets. In this respect, the return on government bonds as perceived by investors turns out to be smaller than that observed in the market when adjusted for the positive correlation with the return on pension wealth. In turn, such correlation could be seen as arising from a common default risk deriving from the fact that, in Italy, the State is both the collector of pension funds and the issuer of government securities.

Over and above their implications for the future trends of the Italian economy, these results should of some interest for most European countries which share some of the Italian institutional arrangements. In particular, if similar results concerning the influence of illiquid assets on portfolio allocation were to be derived for other European countries, the role of market entry liberalization and fiscal harmonization in the process of European financial integration would be somewhat retrenched. Other institutional arrangements such as social security systems, pension schemes and labour legislation would call for an harmonization across European countries in order to prevent destabilizing capital movements induced by return differentials.

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Data Appendix to

NON MARKETABLE ASSETS AND HOUSEHOLDS' PORTFOLIO CHOICES: A CASE STUDY OF ITALY

by

Claudio Giraldi, Rony Hamaui and Nicola Rossi

The present Appendix provides a detailed list of the statistical sources and full references on the methodologies used to reconstruct the data set. This Appendix witnesses the problems encountered in organising a homogeneous data base and its careful examination is, in many respects, essential for a correct interpretation of the empirical analysis undertaken later on.

The data set is basically an update and enhancement of the data set used in Giraldi, Hamaui and Rossi (1990). It virtually accounts for all real and financial assets held by Italian households. It should be recalled that in Italy the latter includes family-run companies. Moreover, in official statistics, households are considered a residual group where all errors and omissions pile up. The data set considers, in addition to financial wealth, real and pension wealth. Real wealth includes an estimate of the housing stock, land, and durable goods; pension wealth includes social security, underwriting reserves and employment termination allowances (for simplicity's sake, pension funds henceforth), whereas excludes life insurance and shares in private pension funds

In particular, Table A.1 provides a full account of the definition and sources for data on supplies and on rates of return of the real and financial assets held by households. Table A.2, instead, describes the evolution of taxation on financial in Italy since 1970.

Figure 1 shows that real wealth is about one half of Italian households total wealth. In particular, the share of real wealth, fluctuating between 45 and 55 percent, has substantially increased in the 1970s and progressively retrenched during the 1980s in connection with the slowing down of inflation and the turnabout in real interest rates. Financial assets instead represented a little more than 20 percent of households wealth at the end of 1988 and the trend in their share appears, to a large extent, to be the mirror image of the real assets trend. In fact, it shows a heavy drop in the 1970s and an important recovery beginning in 1982.

Finally, pension wealth accounts for one third of total households assets and its share, after a abrupt drop off in 1973, steadily increased over time. As shown in Figure 2, this trend is almost entirely due to social security, which accounts for over 90 percent of pension wealth.[26] Underwriting reserves and pension funds instead showed a declining trend which, in the latter case, was due to a new regulation, being effective as of 1977, whereby its degree of indexation was reduced.

Figure 3, which depicts in detail the composition of real wealth, shows that 80% of the latter is represented by housing equity. After a very strong jump in prices at the beginning of the 1970s, this share remains substantially stable over the last 15 years, notwithstanding the fluctuations in housing values.[27] The share of durable goods instead declined drasticallyt from slightly over 12 percent to a little less than 3 percent of total real wealth. The land component increased only marginally over the 20 year period, such that its share was only a little higher than 14 percent in 1988.

With regard to financial assets, Figure 4 confirms some facts already well known: (i) the steady reduction of currency held, as a result of more sophisticated payment systems; (ii) the heavy process of disintermediation experienced by banks beginning at the end of the 1970s contributing to halve the share of banking deposits in households financial portfolios; (iii) the unprecedented growth of government securities weight, reflecting the growing government deficit and the low degree of its money financing; (iv) the slow but steady reduction of deposits with other financial intermediaries which are failing to satisfy more sophisticated needs of households; (v) fluctuations in the weight of equities reflecting the trend in prices on the stock exchange, as well as the positive effect of the introduction of mutual funds; (vi) long lasting difficulties of private bond issues which are subject to strong competition by government securities; (vii) the minor role of foreign assets due to capital controls during most of the studied period.

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26. The methodology for reconstructing social security wealth is described in detail in Beltrametti (1985).

27. The methodology for reconstructing the housing stock is described in Marotta(1986). With respect to that methodology, the present Appendix innovates in that, in order to define the benchmark for housing stock, it uses the 1981 Census rather than that of 1971.

FIG.1 - COMPOSITION OF HOUSEHOLDS TOTAL WEALTH

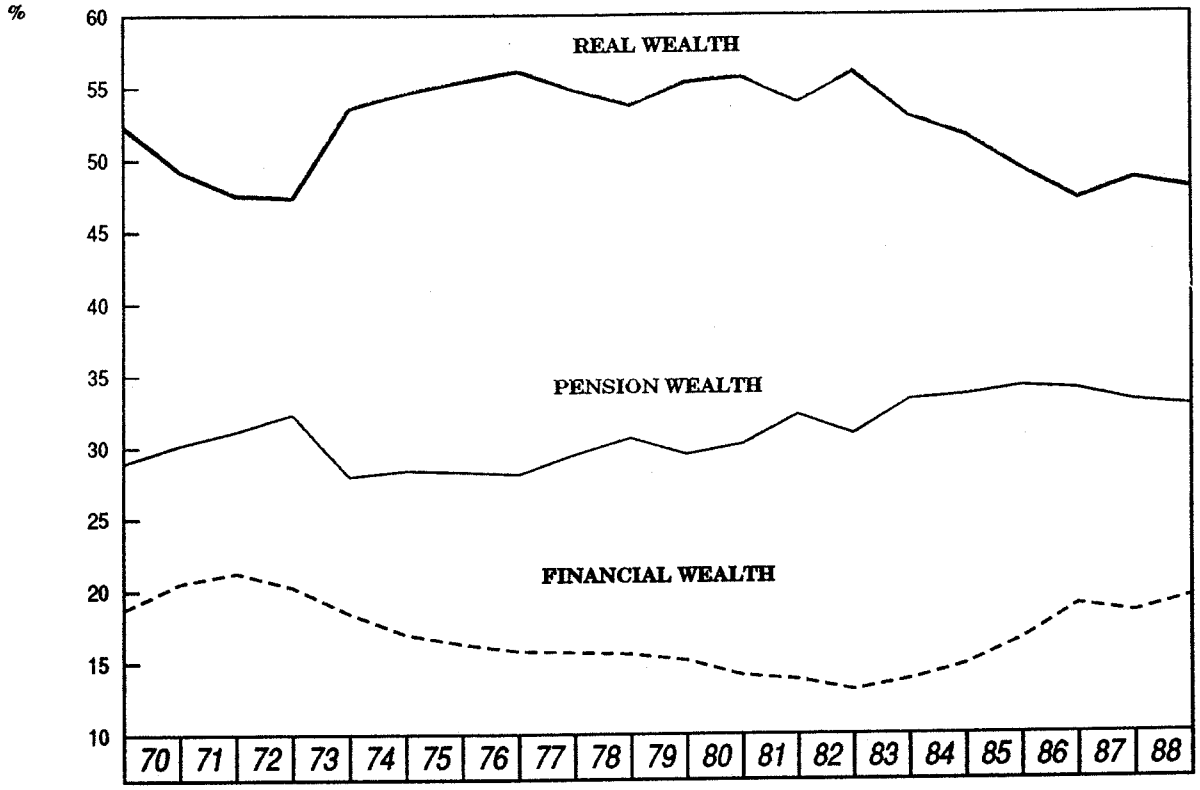

FIG.2 - COMPOSITION OF HOUSEHOLDS PENSION WEALTH

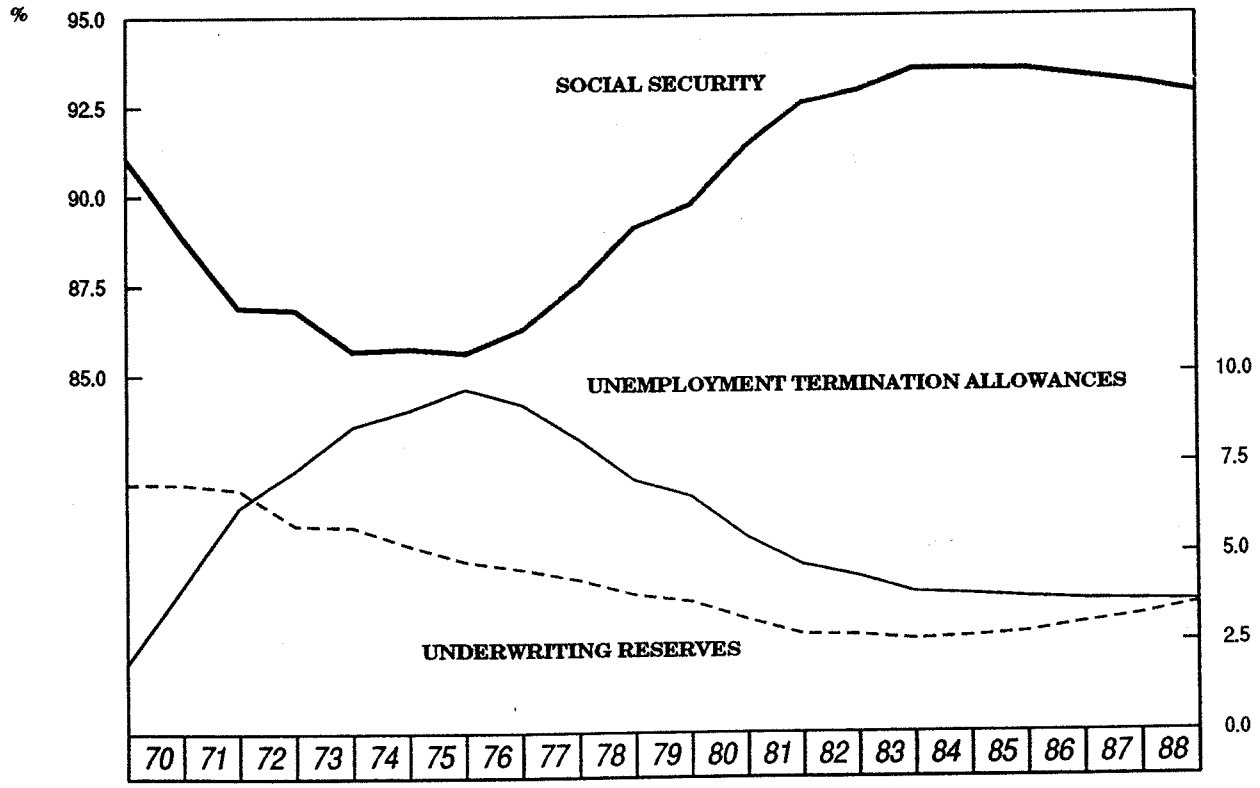

FIG.3 - COMPOSITION OF HOUSEHOLDS REAL WEALTH

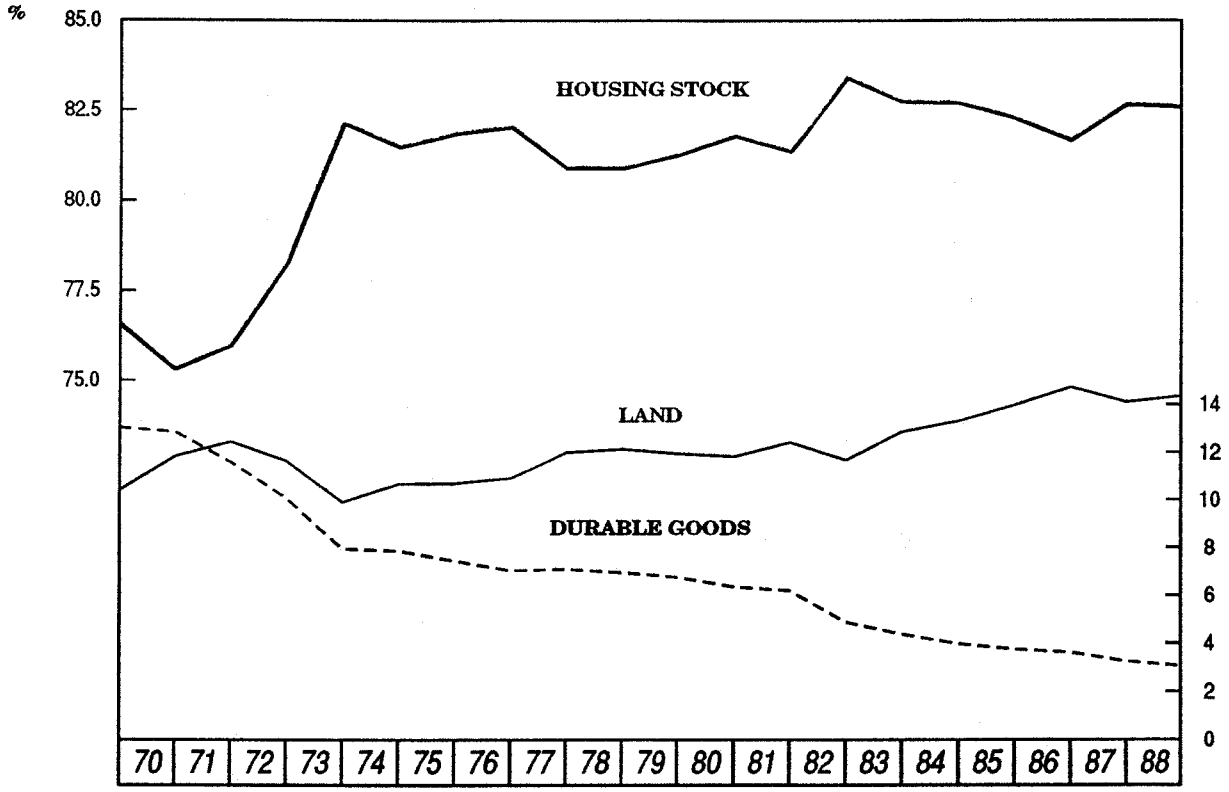

FIG.4 - COMPOSITION OF HOUSEHOLDS FINANCIAL WEALTH

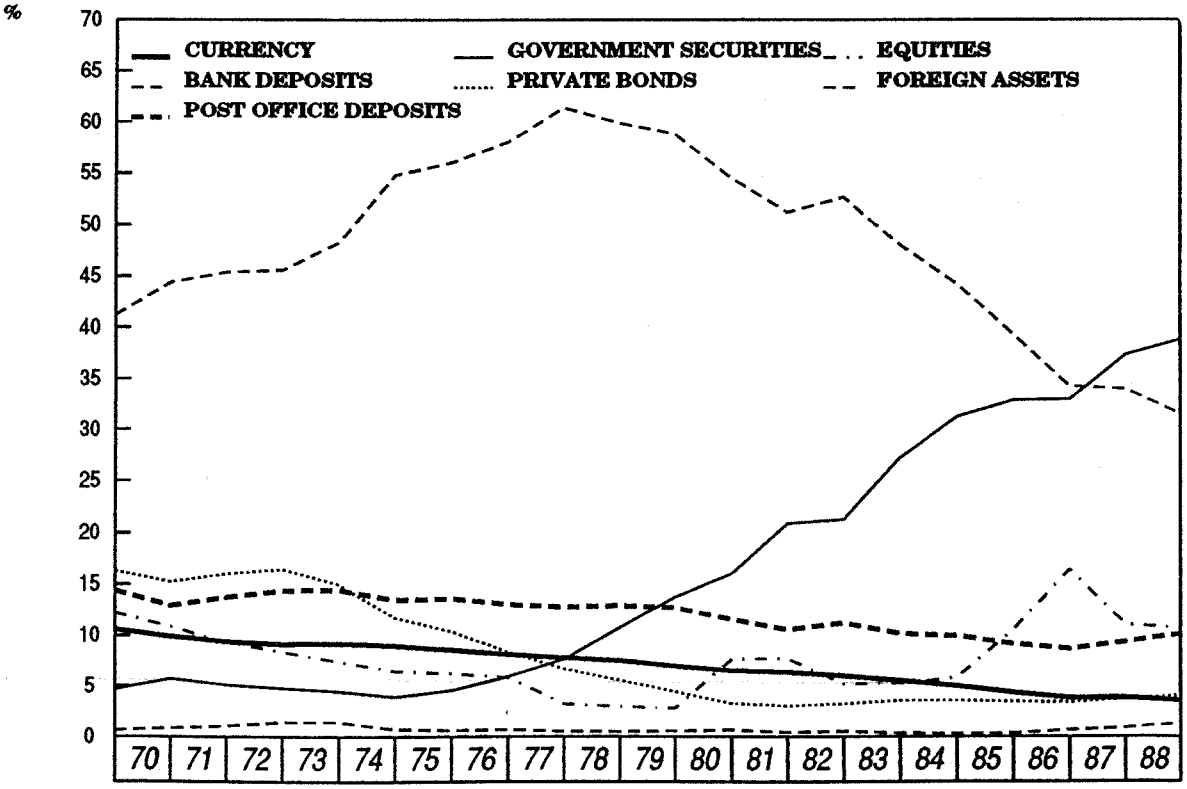

Table A.1

SOURCES AND DEFINITION OF VARIABLES

	MARKETABLE ASSETS[1]	
SERIES	**DEFINITIONS**	**SOURCES**
Bank Deposits	**Assets:** Time and sight deposits + bank acceptances.	Banca d'Italia, RA.
	Return: Yield on time and sight deposits over Lit. 20 million.	Banca d'Italia, CR.
Deposits with other financial institutions	**Asset:** Post Office deposits + Deposits with special credit institutions.	Banca d'Italia, RA.
	Return: Weighted average of yields on post books and bonds of the Post Office.	Banca d'Italia, RA.
Government bonds	**Asset:** Treasury bills (BOT) + Credit certificates of the Treasury (CCT) + Public agencies bonds + Local government bonds + Other government bonds (BTP) + Investment trusts holdings of government bonds (all at book value).	Banca d'Italia, RA. Banca d'Italia, RA.
	Return: Weighted average of yields on Long-term government bonds (BTP), Credit certificates of the Treasury (CCT) and Treasury bills (BOT).	
Corporate bonds	**Asset:** Corporate bonds + Bonds of special credit institutions (all at book value).	Banca d'Italia, RA.
	Return: Weighted average of yields on Corporate and Special credit institutions bonds.	Banca d'Italia, RA.
Equities	**Asset:** Stocks + investment trusts' holdings of stocks (all at market value).	Banca d'Italia, RA.
	Returns: Annual dividend yields. Capital gain/loss: percent change of the share price index (1 month lead).	OECD, FS IMF, IFS.

Foreign assets	**Asset:** Foreign bonds + Investment trusts' holdings of foreign assets. **Returns:** Yield on 3-month eurodollar deposits in London. Foreign exchange gain/loss: percent change of Lira/$ exchange rate (1 month lead).	Banca d'Italia, RA. OECD, FS. IMF, IFS

	CURRENCY AND NON-MARKETABLE ASSETS	
SERIES	**DEFINITIONS**	**SOURCES**
Currency	**Asset:** Notes and coins.	Banca d'Italia, RA.
Pension wealth	**Asset:** Underwriting reserves + Employment termination allowances + Social securities fund (INPS).	Banca d'Italia, RA Beltrametti (1988)
Private residential capital and durable goods	**Asset:** Nominal stock of private residential capital (including land) + households durable goods.	Marotta (1988), Inea A, Banca d'Italia, (1986).

Sources : *Banca d'Italia, Relazione Annuale; INEA, Annuario di Economia Agraria, OECD, Financial Statistics; IMF, International Financial Statistics.*

Notes: *(1) As long as residual miscellaneous assets could not be allocated to any of the nine assets considered, they were substracted from the total.*

Table A.1

TAXATION OF FINANCIAL ASSETS

ASSET	TAX
Bank deposits	Withholding tax Rate: 15% (1970) - 15-20% (1975) - 21.6% (1982) - 25% (1983) - 30% (1988)
Deposits with other financial institutions	Withholding tax Rate: **P.O. Bonds:** 0% (1970) - 6.50% (1986) - 12.50% (1987) **Savings Dep. with P.O.:** 15% (1970) - 15-20% (1975) - 21.6% (1982) - 25% (1983) - 30% (1988)
Government bonds	Withholding tax Rate: 0% (1970) 6.25% (1986) - 12.50% (1987)
Private bonds	Withholding tax Rate: **Bonds:** 30% (1970) - 20% (1975) - 0% (1980) - 10.8% (1982) - 12.5% (1984). **ICS:** 10% (1970) - 0% (1980) - 10.8% (1982) - 12.5% (1984)
Equities, yield	Withholding tax; since 1977 with tax credit Rate: 0
Equities, capital gain	Exempted with exceptions Rate: 0
Foreign assets	Withholding tax + implicit cost of non interest bearing deposit. Rate: 30% (1970) - 53% (1973) - 50% (1984) - 44% (1985) - 39% (1986) - 30% (1987)

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