The effect of house prices on household saving: the case of Italy[*]

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Abstract

In this paper we study the effect on Italian households' saving behaviour of a change in real estate wealth using the Bank of Italy's Survey of Household Income and Wealth (SHIW) dataset. We relate annual household saving to capital gains in housing, controlling for other characteristics such as age. In line with the empirical predictions of our model, we find the oldest households – who are less touched by the higher costs of future rents – to be the most affected by an increase in real net housing wealth; younger households, on the other hand, are not significantly affected by house price increases in their saving decisions. We also take into account that observing capital gains is conditional on owning housing wealth and estimate the different impact of house price changes on the savings behaviour of homeowners and renters. Our estimates suggest that a house price increase raised consumption not only for homeowners but also for renters.

1 Introduction

Household saving rates have been steadily declining in recent periods in the US, the UK and Canada while Italy does not seem to have followed this pattern, as shown in Figure 1. The standard justification is that while Americans are raising their living standards cashing-in their skyrocketing house valuations, Italians are not perhaps because they perceive more expensive housing as a hindrance to their well-being.

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In a standard life-cycle model any shock to the total present value of lifetime wealth, such as shocks to the prices of financial securities and housing, would translate into a shift in the current and future consumption level. Two are the key factors at work. First, real estate is the most important component of wealth and, second, housing prices have recently grown at an exceptionally high pace; therefore the estimation of the marginal propensity of consumption (MPC) out of housing wealth represents a key step in order to understand the real effects of wealth changes.

Theoretical predictions on which kind of asset shocks ought to generate the stronger impact on consumption remain ambiguous, as shown by Carroll (2004). On the one hand, a change in the house value tends to generate rather illiquid effects, because real estate is usually traded in markets plagued by high frictions and pervasive tax effects, while houses are generally non-divisible .On the other hand, housing wealth is widely spread among the population and largely involves not only the highest income categories, who mainly hold financial assets (typically equities) and have modest marginal propensities to consume, but also poorer segments, whose consumption and savings behavior is considerably reactive to wealth. Finally, even disregarding the important role of bequests, house price fluctuations may have no effects on consumption if moving costs are large and the borrowing possibilities for the less wealthy, liquidity-constrained agents are limited (Bover, 2006, Skinner, 1993).

There is a quite large body of empirical literature that tries to estimate the effects of wealth changes on consumption and savings. At the aggregate level Catte et al. (2004) provide an estimate of MPC relative to both housing and financial wealth for OECD countries. Their findings show a MPC rate ranging from 0.05 to 0.08 for Australia, Canada, the Netherlands, the UK and the US, while the MPC for Italy, Japan and Spain is approximately zero, and not significant for France and Germany. Interestingly, their estimates of housing wealth effects are larger than those on financial wealth effects for most of the countries analyzed.

Studies using aggregate data however raise serious concerns mainly for the lack of relevant controls (Muellbauer 2007) and for the risk that spurious relationship may affect the estimates.

To address these concerns, a number of further studies have turned to examine the same issues using panel-like, microeconomic data sets concerning the behavior of individual households with regard to their saving and housing decisions (following Skinner 1993). However, these datasets rarely contain both measures of consumption/saving and household assets. For European countries, Disney et al. (2002) use the information contained in the BHPS on spending patterns of British households along with county-level indicators of house prices to estimate the British MPC. Their report a MPC for housing wealth shocks of approximately 2% during the house price boom of the 1990s. Grant and Peltonen (2005) use the panel section of the Italian SHIW to estimate the impact of changes in housing wealth on non-durable consumption. Their estimated housing wealth effects are small and not significant in general, i.e. their MPC is approximately 1% for homeowners. A similar study, conducted by Guiso et al. (2005) finds that home-owner MPC is about 0.02 cents out of a one Euro increase in housing capital gains.

Siermiska and Takhtamanova have used the first wave of the Luxembourg Wealth Study (LWS), an on-going project making cross-country analysis. In their study, which focuses on a sample of homeowners in three countries possible, Canada (1999), Finland (1998), and Italy (2002), they estimate the MPC out of financial and housing wealth. The authors show the greater influence of housing-related versus financial-related wealth effects. Their findings suggest that out of one percent increase in housing wealth households increase by about 0.1% their expenditures (0.12% for Canada, 0.1 for Finland and 0.13% for Italy).

What makes the Italian economy of particular interest is that Italy shares, with UK, the highest ratio of housing wealth to total disposable income with a value of about 8 (Bartiloro et a. 2007). The general observation of Muellbauer (2007), that housing is the most important component of household wealth for OECD countries is then particularly true for the Italian households (see also Bertola and Hochguertel (2007)).

In this paper we want to assess the effect of a change in the value of real estate assets on optimal consumption and savings behavior for Italian households, as a function of households' age and composition. We present a simple model with representative households living for two periods deriving utility from both housing services and other goods in each period.

Our theoretical model predicts the higher the age of the household, and its net equity estate at the beginning of its life, the higher the MPC out of housing wealth. We then test such predictions on the SHIW data, which are representative of the universe of Italian dwellings owned or rented by the households. The dataset contains several features that make it particularly suitable for our research. First, detailed information on households assets, including housing, is provided in the dataset. Although an appraisal of dwellings is not available, respondents to the SHIW questionnaire, regardless on their ownership status, provide subjective evaluation of the dwellings where they live. Second, every household is asked about its outstanding debt on real estate asset. The net value of housing can thus be generated using information available in the data. Finally, the SHIW data provide information on socioeconomic status (such as age, education, income, geographical residence) of each household at every wave. Our results suggest that the household saving for old households is negatively and significantly related to the household capital gains in housing. On the contrary, for young households (where the main component has less than 40 years) this relation is positive, although only marginally significant. While old households seem to be able to cash in at least a small quota of the net real wealth increase in their real estate portfolio, this is not the case for young households. When house prices increase, the latter are confronted with an expectation of higher future rents: since the demand for housing services is, up to a minimum point, inelastic (and probably increasing), young households anticipate they will have to spend higher amounts for their housing needs, and do not cash in the wealth increase induced by higher housing prices.

Our model points out that the MPC to housing wealth depends on various observable characteristics of the household, such as age, initial endowment in real estate, and its financial situation. Our analysis on SHIW data confirms that only old Italian households increase their consumption in non-housing related goods after an increase in their net real estate wealth. The paper is organized as follows. Section 2 presents the model. Section 3 illustrates some stylized facts on the housing wealth in Italy, and Section 4 describes the SHIW dataset. Section 5 presents the estimation methodology with some preliminary results, and Section 6 concludes. Appendix A shows how to compute the equilibrium of the housing market, while Appendix B collects the Tables.

2 The model

We analyze a simple life-cycle two period model that follows closely Skinner (1993)[1]. As in the latter and in other papers (Campbell and Cocco (2005), Iacoviello (2004)), we include the consumption of housing services in the household's utility function. Then, according to the standard life-cycle model, households increase their consumption in both housing services and other commodities (through a "substitution effect") by some fraction of the increase in their total wealth. However, the same fluctuations in house prices produce different wealth effects on households with different characteristics (Dreyer-Morris (2005), Bover (2006)), such as the age of the household: older homeowners should react more to an increase in the value of their housing property since they will have to spend less in terms of future housing services. The objective of this section is to solve for the consumption choices of households in a two periods[2] dynamic partial equilibrium framework as a function of their age and their initial endowments in real estate.

Households derive utility in each period t of their life from the consumption of both housing services h_t and other consumption goods c_t, where the utility function is time separable and isoelastic:

$$U(c_t, h_t) = \frac{c_t^{1-\gamma}}{1-\gamma} + \mu \frac{h_t^{1-\gamma}}{1-\gamma}$$

They discount their future utility at a rate δ so that their lifetime utility is equal to

$$U(c_t, c_{t+1}, h_t, h_{t+1}) = \frac{c_t^{1-\gamma}}{1-\gamma} + \mu \frac{h_t^{1-\gamma}}{1-\gamma} + \frac{1}{1+\delta}\left(\frac{c_{t+1}^{1-\gamma}}{1-\gamma} + \mu \frac{h_{t+1}^{1-\gamma}}{1-\gamma}\right) \qquad (1)$$

[1] We study a partial equilibrium model since the purpose of our empirical analysis will be to describe how Italian households change their saving decisions as a response to an unexpected change in their real estate wealth. From this microeconometric analysis it is hard to infer how households consumption choices affect their demand of housing, hence its price, making then a general equilibrium model of little use.

[2] The simplest possible model capturing the heterogeneity in the reaction of consumption to housing wealth between young and old needs households living at least two periods.

The interest rate r paid on savings equals the loan rate charged on debt in a riskless world without financial imperfections. The price of the non-housing commodity is normalized to one, while the price of the housing service (i.e. the rent per period t) is denoted by ρ_t. At each period of his lifetime the household receives a (certain) labor income Y.

At the end of the first period, each household chooses his optimal level of real estate holdings h^*_{t+1}, where $h^*_{t+1} > \overline{h}_t$ indicates an investment in housing. Finally, in the second period the household can liquidate its real estate owning[3].

The budget constraints in each period are then:

$$\begin{aligned} t \quad &: \quad A_t + c_t + \rho_t h_t \leq Y_t + \rho_t \overline{h}_t \qquad (2) \\ t+1 \quad &: \quad c_{t+1} + \rho_{t+1} h_{t+1} \leq Y_{t+1} + A_{t+1}(1+r) + \left(\overline{h}_t - h^*_{t+1}\right) P_t + \rho_{t+1} h^*_{t+1} + \\ & \quad + \frac{P_{t+1} h^*_{t+1}}{1+r} \end{aligned}$$

where A_t indicates the net financial wealth of the household at the end of the first period of life, while $\overline{h}_t$ is its initial endowment of housing assets. Thus $\left(\overline{h}_t - h^*_{t+1}\right) P_t$ is the revenue the investor obtains selling part of his initial real estate endowment[4] $(\overline{h}_t - h^*_{t+1})$ at the beginning of period $t+1$ at price P_t[5]; finally, $\rho_{t+1} h^*_{t+1}$ is the rent of the new real estate holding and $\frac{P_{t+1} h^*_{t+1}}{1+r}$ is the revenue from the disinvestment of the housing equity.

In this model we assume households know at the beginning of their life cycle all future realizations of the parameters in the budget constraints; we allow only unexpected shocks to hit the housing rents at a later periods $\tau \geq t$ (and hence the house prices P_t and P_{t+1}).

Equivalence of renting and buying at equilibrium under the conditions of no uncertainty In our model with no borrowing constraints the amount invested in real estate is irrelevant for the optimal consumption profile. Indeed, markets are complete, and households can transfer wealth intertemporally simply by saving (or borrowing) cash (at rate r). By a simple no-arbitrage argument, at equilibrium the investment in real estate must provide the same return r (abstracting from transaction costs) of the financial investment.

Thus the equilibrium price of housing equity is equal to the present value of future rents[6]:

[3] This is possible, for example, through a "reverse mortgage".

[4] Of course we assume that nobody can go short in housing, $h_{t+1} \geq 0$.
Also, if $h^*_{t+1} > \overline{h}_t$ the household is actually increasing his real estate owning buying at price P_t.

[5] We assume that the house prices are "ex-rent", that is houses are valuated at the end of the period. Hence, if you sell the house at the end of period t (that coincides with the beginning of period $t+1$), you earn P_t.

[6] Every individual has to be indifferent between selling the house at the end of a period t (earning P_t), and selling it one period later (payoff $\frac{P_{t+1}}{1+r}$) cashing in the period rent as well (ρ_{t+1}).

$$P_t = \sum_{j=t+1} \frac{\rho_j}{(1+r)^{j-(t+1)}} \tag{3}$$

The solution of the model The solution of the model closely follows Skinner (1993). If a household is not restricted in his access to the capital market at t, A_t can be negative and combining the two budget constraints we obtain the intertemporal constraint:

$$\begin{aligned} c_t + \rho_t h_t + \frac{c_{t+1} + \rho_{t+1} h_{t+1}}{1+r} &= Y_t + \rho_t \overline{h}_t + \frac{Y_{t+1} + \left(\overline{h}_t - h^*_{t+1}\right) P_t + \rho_{t+1} h^*_{t+1}}{1+r} \\ &+ \frac{P_{t+1} h^*_{t+1}}{(1+r)^2} \end{aligned} \tag{4}$$

Furthermore, using the relation $P_t - \rho_{t+1} = \frac{P_{t+1}}{1+r}$ for the equilibrium in the real market, we can rewrite the intertemporal budget constraint as:

$$c_t + \rho_t h_t + \frac{c_{t+1} + \rho_{t+1} h_{t+1}}{1+r} = Y_t + \frac{Y_{t+1}}{1+r} + \rho_t \overline{h}_t + \frac{P_t \overline{h}_t}{1+r} \tag{5}$$

and solve the household maximization problem max(1) in $\{c_t, c_{t+1}, h_t, h_{t+1}\}$ under the constraint (5)[7].The optimal consumption level is the following:

$$c_t = \frac{W(Y_t, Y_{t+1}; \rho_t, P_t; \overline{h}_t)}{K(\mu, \gamma, \delta; r, \rho_t, \rho_{t+1})} \tag{6}$$

where $W(Y_t, Y_{t+1}; \rho_t, P_{t+1;}\overline{h}_t) = Y_t + \frac{Y_{t+1}}{1+r} + \overline{h}_t \left[\rho_t + \frac{P_t}{1+r}\right]$ is the lifetime wealth of the household, and

$$\begin{aligned} &K(\mu, \gamma, \delta; r, \rho_t, \rho_{t+1}) = \\ &= \left[1 + \rho_t \left(\frac{\mu}{\rho_t}\right)^{\frac{1}{\gamma}} + \left(\frac{1+r}{1+\delta}\right)^{\frac{1}{\gamma}} (1+r)^{-1} + \left(\frac{1+r}{1+\delta}\right)^{\frac{1}{\gamma}} (1+r)^{-1} \rho_{t+1} \left(\frac{\rho_t}{\rho_{t+1}}\right)^{\frac{1}{\gamma}} \left(\frac{\mu}{\rho_t}\right)^{\frac{1}{\gamma}}\right] \end{aligned}$$

Simply substituting into the f.o.c.'s above one can obtain the solution in c_{t+1}, h_t and h_{t+1}; in particular:

$$c_{t+1} = \left(\frac{1+r}{1+\delta}\right)^{\frac{1}{\gamma}} \frac{W(Y_t, Y_{t+1}; \rho_t, P_t; \overline{h}_t)}{K(\mu, \gamma, \delta; r, \rho_t, \rho_{t+1})} \tag{7}$$

[7] As stated before, the investment choice in real estate at the beginning of date $t+1$, h^*_{t+1} is irrelevant for the solution.

2.1 Empirical implications of the model

The results in (6) and (7) allow us to compute some comparative statics that we will use in our empirical analysis.

First, consider a young household born at time t, and assume P_{t+1} has increased [8]due to unexpectedly high rents ρ_τ at some future time $\tau > t+1$, i.e. after his lifetime is over[9]. Our model predicts that the response of current consumption to such a shock is positive only for households with positive real estate endowment:

$$\frac{\partial c_t^y}{\partial \rho_\tau} = \frac{\partial c_t^y}{\partial P_{t+1}} = \frac{\frac{\overline{h}_t}{1+r}\frac{\partial P_t}{\partial P_{t+1}}}{K} = \frac{\frac{\overline{h}_t}{1+r}\frac{1}{1+r}}{K} > 0 \tag{8}$$

It is also noteworthy that young households (with a positive endowment in real estate at the beginning of their life) increase their current consumption more than their future consumption if $\gamma > 1$[10] after such a shock:

$$\frac{\partial c_{t+1}^y}{\partial \rho_\tau} = \left(\frac{1+r}{1+\delta}\right)^{\frac{1}{\gamma}} \frac{\partial c_t}{\partial P_{t+1}}$$

Alternatively, consider the effect on the consumption for the young household y due to an increase in the rent ρ_{t+1}. This will result in a direct increase in P_t:

$$\begin{aligned}\frac{\partial c_t^y}{\partial \rho_{t+1}} &= \frac{\partial\left(\frac{W(.)}{K(.)}\right)}{\partial \rho_{t+1}} = \frac{\frac{\partial W}{\partial \rho_{t+1}}K - W\frac{\partial K}{\partial \rho_{t+1}}}{K^2} = \frac{\frac{\partial W}{\partial P_t}K - W\frac{\partial K}{\partial \rho_{t+1}}}{K^2} \\ &= \frac{\overline{h}_t\lambda K - W\left(\frac{\mu}{\rho_t}\right)^{\frac{1}{\gamma}}\left(\left(1-\frac{1}{\gamma}\right)\frac{1}{(1+r)}\left(\frac{\rho_t}{\rho_{t+1}}\right)^{\frac{1}{\gamma}}\left(\frac{\mu}{\rho_t}\right)^{\frac{1}{\gamma}}\left(\frac{r+1}{\delta+1}\right)^{\frac{1}{\gamma}}\right)}{K^2}\end{aligned} \tag{9}$$

where the first term is the wealth effect and the second term is a substitution effect[11] (negative for $\gamma > 1$). We predict that the response of consumption to shocks in rents occurring during the lifetime of the household is lower than the one due to shocks occurring further in the future.

Let us analyze the consumption reaction of an old household o born at $t-1$ to a change of ρ_{t+1} (hence P_t). We denote with h_t^* the optimal level of real estate holdings h_{t+1}^* of household o at the beginning of period t. At this moment household o solves

$$\begin{aligned}\max_{c_t^o, h_t^o} U(c_t^o, h_t^o) &= \frac{(c_t^o)^{1-\gamma}}{1-\gamma} + \mu\frac{(h_t^o)^{1-\gamma}}{1-\gamma} \\ s.t. \qquad c_t^o + \rho_t h_t^o &\leq Y_t + P_t h_t^*\end{aligned} \tag{10}$$

[8] Announced at the beginning of period t: remember that we consider consumption choices in condition of certainty, so the household knows the realized value of rents.

[9] Insert here a graph explaining the precise timing of rents/prices.

[10] At equilibrium $r = \delta$ (the interest rate must be equal to the intertemporal discount factor).

[11] Higher rents make more expensive the consumption of the housing service in the second period.

Its current consumption c_t^o reacts more to a shock in P_t than the consumption of young households. This is because of two reasons: first, they entirely consume in their last lifetime period the unexpected total wealth gain $h_t^* \partial P$[12]. Secondly, they do not suffer any substitution effect, since they will not have to pay during their lifetime the cost of a higher rent ρ_{t+1}. The same argument holds of course for an increase in later rents (captured by an increase in P_{t+1})[13].

Thus, our model predicts that, excluding moving costs and bequests motives[14], the consumption of the older generations should be more reactive to shocks in rents and/or house prices. All the effects are stronger for households with higher real estate endowments[15].

3 The Italian households' wealth: some stylized facts

Wealth is a key variable in shaping household saving and consumption. According to the theory of intertemporal optimization, permanent income is the annuity value of total wealth, constituted by financial, real and human asset. Particularly at later stages in life, wealth, rather than current income, is the crucial variable determining consumption, as it peaks around retirement after when individuals start living on their wealth to keep their consumption levels constant. Hence, total assets are the key variable to understand welfare possibilities of households, particularly at later stages of the life cycle.

Italian household's net wealth is one of the highest among the main OECD countries. In 2005, it was estimated to be equal to 350,000 Euro per household and 135,000 Euro per capita (Ministry of Finance, 2005). Net wealth has grown rapidly between 1995 and 2005, by a total of 48%, equivalent to an average annual real growth rate of 2.7%.This rate of increase has not been homogenous over time, ranging from 5.7% in 1997 to 0.3% in 2001, and then increasing again up to 4.3%.

An increase in wealth can be generated by either additional savings or capital gains. While their impact has been approximately equal in 1995-2000, capital gains have been almost entirely responsible for the subsequent increase in wealth (D'Alessio et al.). Indeed, over the whole period, capital gains accounted for 57% of real wealth growth.

[12] Recall that we assume there is no bequest motive in the model.

[13] Again, because of the absence in any substitution effect.

[14] We acknowledge that leaving the bequest motives out of the analysis is somewhat unrealistic. However, our main comparative statics are still valid when the bequest motive is not strong enough: only if the living household wants to completely compensate the heirs for all the future increase in rents then the change of consumption to housing wealth would not depend on the household's age.

[15] In reality, also moving costs affect the decision to liquidate a real estate investment (and move) or not; thus they may neutralize any real wealth effect due to an increase in house prices for house-owning households (Skinner (1989), Campbell and Cocco (2005)). High personal moving costs can then be invoked to explain why we observe that some households are not "downsizing" their real estate net holdings, apparently giving up a net *real* wealth gain.

Since housing has played the key role in shaping households asset, we now look at housing investments evolution to detect whether housing has driven the wealth increase. Italy shares with (most of the) other OECD countries a substantial increase in house prices over the last 15 years. The magnitude of the price increase has been comparable with that of other European countries, with a real annual increase of 6.6% for the time period 2000-2005 (deNoord 2006). Despite the importance of housing as the principal component of households wealth, little information can be gathered on house prices and housing wealth in many industrialized countries.

No official estimates are available on Italian house prices at macro level; however, data are collected on a regular basis by the Ministry of Finance ("Osservatorio del Mercato Immobiliare dell.Agenzia del Territorio") and by two private sources ("Nomisma" and "Il Consulente Immobiliare"). Moreover, the Bank of Italy's Survey of Household Income and Wealth (SHIW) provides the subjective house value, i.e. the house value perceived by respondents. Objective and subjective house prices compare relatively well, as shown in a recent work by Cannari and Faiella (2007).

4 The SHIW dataset

We use the survey of Household Income and Wealth to examine whether housing price appreciation has displaced savings in other forms. The Bank of Italy's first Survey of Household Income and Wealth (SHIW) was conducted in 1965. Since then, the survey was conducted yearly until 1987 (except 1985) and every two years thereafter.

The primary purpose of the Bank of Italy's Survey of Income and Wealth is to collect detailed information on demographics and the socioeconomic behavior of Italian households, such as consumption, income and balance sheets.

The SHIW surveys a representative sample of the Italian resident population. Sampling takes place in two stages, first Municipalities and then households. Households are randomly selected from registry office records. The survey covers about 8,000 households, defined as groups of individuals related by blood, marriage or adoption and sharing the same dwelling. Starting in 1989, each SHIW has re-interviewed some households from the previous surveys. Respondents included in the panel component of the dataset have increased over time: 15 percent of the sample was re-interviewed in 1989, 27 percent in 1991, 43 percent in 1993, 45 percent in 1995, 37 percent in 1998 and 48 percent in the year 2000.

The SHIW data have the advantage of being representative of the universe of Italian dwellings owned or rented by the households. The dataset contains several features that make it particularly suitable for our research. First, detailed information on household assets, including housing assets and outstanding debt on real estate assets. As for housing wealth, every respondent has to declare the subjective value of the house where s/he resides. The net value of housing can thus be generated using the information available in the data.

As usual, also information on socioeconomic status (such as age, education, income, geographical residence) of each household component is asked in each wave.

Our final sample covers the year range 1995-2004 and is composed by 11,517 households, and excludes potential outliers. Table 1 illustrates the descriptive statistics of the sample used for the regression analysis.

5 Empirical Methodology and Estimation Results

In our empirical specification, we want to estimate the effect of housing capital gains on household saving; hence our estimation strategy, using a standard OLS technique, is as follows:

$$S_{ht} = \mathbf{X}'_{ht}\beta + \gamma\Delta H_{ht} + \varepsilon_{ht} \tag{11}$$

where S is annual household saving, $\mathbf{X}$ is a set of socio-demographic regressors, ΔH is the change in net housing wealth and ε is the error term. Subscript h and t stand for households and time, respectively. The main regressors of interest in our analysis are those related to the households' capital gains in real estate investment (ΔH).

Saving is defined as the difference between net available income and consumption. Hence, our measure of saving does not include capital gains. Consumption includes non durable consumption and the cost of services, which, in turn, include rents. One of the possible impacts of house price increases could be channeled through rents increase. If rents increase as a consequence of house price increases, consumption could increase merely as a reflection of higher rents, without implying higher level of welfare for households. However, approximately all Italian households (95%) reside in the house they own, thus they do not have to pay for higher housing services.

A precise test of our predictions focuses on the role played by age on the impact of housing wealth increase on saving. More specifically, our model predicts that the older the age at which the (unexpected) price increase materializes, the higher the impact on consumption. Thus, the interaction of housing capital gains with the age of the household head could shed some light on the different effect that real estate price boost had on consumption, according to the age of the owner. For this reason, we add a set of interaction terms, capturing the impact of housing wealth change for households whose head is under 40, between 40 and 55 and older than 55, respectively.

Table 2 illustrates our estimation results. House price increases have opposite effects if we compare the young and the old cohorts, as predicted by our model. Middle-aged households do not appear to be significantly affected by house price changes.

Young households do not react to house price increase. Conversely, older households (i.e. households whose head is aged over 40) do take into account the house capital gains by increasing their standard of living and decreasing resource accumulation, in accordance with the theory predictions.

The older the household head, the stronger the reaction. For households whose head is over 40 the (negative) elasticity of savings to house price increase is around 1%. Equivalently, an increase in house net value of 10,000 Euro would generate less savings by about 50 Euro per year dissavings for households whose head is over 40. One possible interpretation for such findings is that young cohorts, having to face a longer time period of higher housing services, do not consider the increase in housing wealth as a welfare gain. For younger cohorts, housing wealth capital gains are entirely wiped out by the expected future higher prices for housing services.

The impact of the age of the household on saving is strongly non-linear. Professional status like civil service and self-employment do not significantly affect savings and consumption. One additional component in the household decreases savings by approximately 1400 Euro, the absence of the spouse in the household corresponds to higher savings by the same amount.

The Italian propensity to save out of one Euro increase in their current income is substantially high, amounting to 0.65. Annual savings of Southern Italians are higher than those living in the Central Italy.

Higher education has a detrimental effect on savings, the more educated households showing lower annual savings.

A possible drawback of our analysis is due to the endogeneity of capital gains in housing assets. The observation of capital gains is in fact conditional on being a home-owner, which is a not a random variable but rather a household choice. Moreover, total saving and single components of savings in risky assets, such as housing, are driven by the same (unobserved) factors such as risk aversion and, generally, different preferences. Neglecting these factors might lead to a bias in the estimation of housing capital gains on savings. To address this concern, we jointly estimate the two regimes of savings according to whether or not the household is homeowner by using an endogenous switching regression technique, with known regime separator. The two regimes of savings are jointly estimated as follows:

$$Own^*_{ht} = \mathbf{W}'_{ht}\ g + \nu_{ht} \tag{12}$$

$$S^{owner}_{ht} = \mathbf{X}'_{ht}\beta + \gamma^{owner}\Delta H_{ht} + \varepsilon_{ht1} \tag{13}$$

$$S^{renters}_{ht} = \mathbf{X}'_{ht}\beta + \gamma^{renters}P_t + \varepsilon_{ht2} \tag{14}$$

where $\mathbf{W}$ contains a set of socio-demographic variables at household and community level. The error terms ε_1, ε_2 and ν are normally distributed with variance σ_1, σ_1 and 1 respectively, and $Corr[\varepsilon_1, \nu] = \rho_{1\nu}$, $Corr[\varepsilon_2, \nu] = \rho_{2\nu}$.

Each household's contribution to the likelihood function is the following:

$$\begin{aligned}\ln L_{ht} &= Own * \left(\ln\left(\Phi\frac{(W'g+\rho_{1\nu}(\varepsilon_{ht1})/\sigma_1)}{\sqrt{1-\rho_{1\nu}^2}}\right)+\ln\left(\phi\left((\varepsilon_{ht1})/\sigma_1\right)\right)\right)+ \\ &+(1-Own)*\left(\ln\left(1-\Phi\frac{(W'g+\rho_{2\nu}(\varepsilon_{ht2})/\sigma_2)}{\sqrt{1-\rho_{2\nu}^2}}\right)+\ln\left(\phi\left((\varepsilon_{ht2})/\sigma_1\right)\right)\right)\end{aligned} \tag{15}$$

and we maximize the following likelihood function, consisting of the sum of each contribution:

$$\text{lnL}=\sum_{ht=1..HT}\ln L_{ht} \qquad \text{where HT is the total household-year observations.}$$

Capital gains can affect household savings conditional on owning estate assets; therefore a change in house price can only affect savings through capital gains for homeowners. However, the change in housing prices also affects the saving/consumption decisions of non-homeowners (i.e. renters) through the cost of rents. If housing price increases the cost of housing services will increase as well, forcing renters to face higher future costs for housing services.

For this reason, we include the house price level in the renters' equation (variable P in equation 15). The coefficient γ^R captures the effect of a Euro increase in house prices on renters' savings. The a-priori sign of the latter is ambiguous. If renter-households predict a permanent increase of future house price, they should increase their savings. Conversely, if the house price increase is considered transitory shock, renters would react to the latter by instantly reducing their saving to face current higher housing expenditures. The empirical results would guide us in distinguishing between the two cases.

Results are shown in Table 3, which contains the estimation results for owners' saving in column 1, for renters in column 2 and the determinants of the regime shifter (house owning) in column 3. In order to facilitate the identification of the model we use a set of dummy variables that are likely to affect the supply of housing, hence the owning decision, but have no influence on the overall amount of savings. These are a set of dummy variables relative to the dimension of the city of residence.

Taking into account the endogeneity of real asset ownership does not change results substantially.

The coefficient on house capital gains on savings are similar in magnitude to those of the previous estimates. The coefficients on the other variables do not differ in sign and magnitude from the OLS coefficients except for age that turns out to be non significant and the geographical areas of residence that are significant in this specification.

Turning to the equations of renters (column 2, table 3) the impact of price on savings for renters, our estimates suggest that the price increase acts as a deterrent to consumption: a house price increase determines an equivalent increase in consumption for the renters, the coefficient on price being around

-1 for all age categories[16]. From this result we can infer that renter-households passively react to house prices by simply increasing their consumption, and thus decreasing their savings, when the house price increase materializes. In other words, our data suggest that Italian households consider the price increase as an unexpected shock.

The impact of the determinants of house owning (column 3, Table 3) do not differ in their sign from those of savings with some exception. Age turn to be significant on house ownership with a strong non-linear impact. Education variables do not play a role in the choice of owning a house.

We also run the same regression isolating the impact of capital gains for the primary residence. Results are shown in column 5, 6, and 7 of Table 3. The coefficients on capital gains are smaller in magnitude and significant for older households only. As expected, capital gains on primary residence generate a less substantial impact than capital gains on real assets as a whole, suggesting that the house of residence is not perceived as disposable wealth expect for, and at a minimum extent, older households.

6 Conclusions

In this paper we quantify the Marginal Propensity to save out of non-financial asset for Italian households. According to Skinner (1993) and Carroll (2004), the recent capital gains due to the increase in house prices may have translated in additional consumption: our main objective is to assess the magnitude of this effect, if any, relating it to exogenous characteristics of the household.

For this purpose, we present a simple life cycle model where the representative household lives for two periods and chooses housing services and consumption in other goods.

Using the SHIW data we estimate the annual household saving as dependent on variation in house prices. In line with the empirical predictions of our model, we find that the highest effects of an increase of real net housing wealth relate to the oldest households, who suffer less the factor driving the increase, i.e. higher future rents. On the other hand, younger households are not significantly affected by the recent housing price increase in their saving decisions because the wealth effect tends to cancel out with higher future rents. We also take into account that observing capital gains is conditional on owning housing wealth, a decision that is driven by the attitude toward risk, which, in turn, is responsible for how much to invest in a risky asset and the overall amount of saving. Estimating jointly the two decisions does not substantially change the results.

We finally turn to estimate the different impact of house price changes on savings for renters and homeowners respectively. Somewhat unexpectedly, our estimates show that a house price increase also determines an increase in consumption for the renters, with the coefficient of house price being around -1 for all age categories; as expected, however, the effect is lower than for homeowners.

[16] Each price category coefficient results to be not significantly different from -1 at 50% level.

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Figure 1. Household Saving Rate and Real Housing Price, Italy

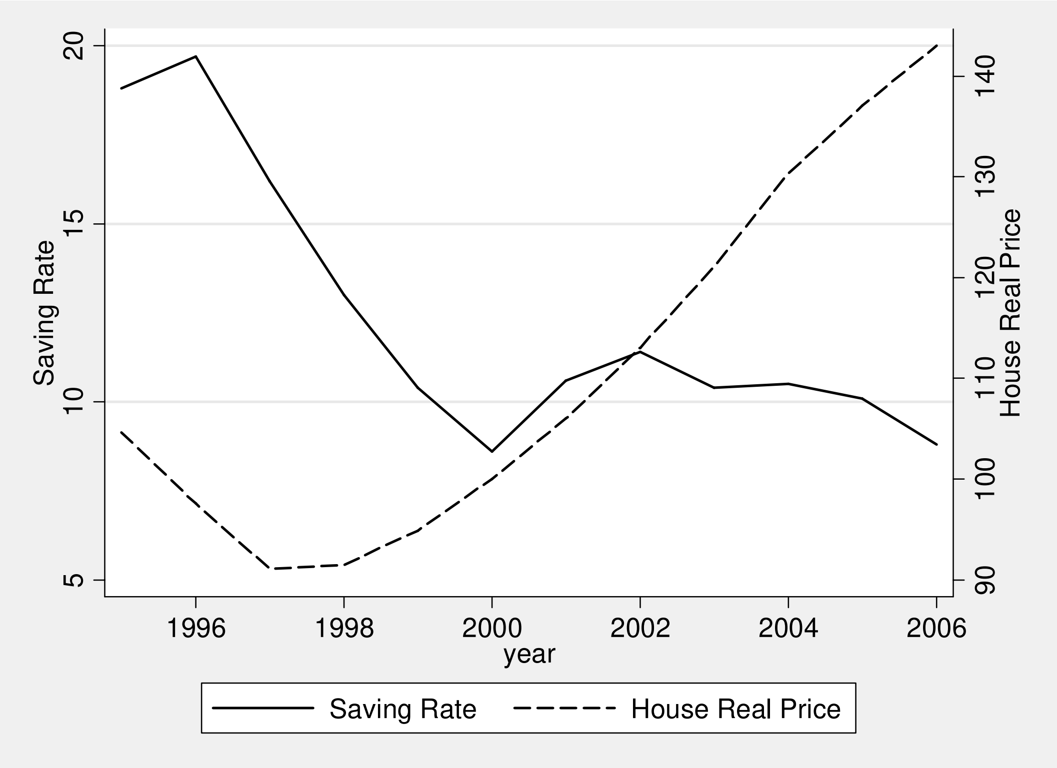

Table 1. Descriptive Statistics

Variables	Mean	Standard Deviation
Savings	8724.38	18026.26
Delta house value *(age<40)	4403.02	40432.64
Delta house value *(age:40-55)	5695.47	58736.37
Delta house value *(age>55)	8635.09	75325.78
Household head's age	56.98	14.53
Age squared	3458.06	1688.02
Household head employee	0.72	0.45
Number of household components	2.82	1.30
No spouse in the household	0.11	0.32
Household income	31380.93	24878.31
Own housing wealth	0.72	0.45
Council inhabitants: <20,000	0.28	0.45
Council inhabitants: 20,000-40,000	0.21	0.40
Council inhabitants: 40,000-500,000	0.43	0.49
Council inhabitants: >500,000	0.07	0.26
North	0.43	0.49
South	0.36	0.48
Degree	0.09	0.28
College	0.28	0.45

SHIW dataset: Waves 1995-2004. Observations: 11,517

Table 2. Saving estimates.

	Savings
Delta house value *(age<40) *10^{-3}	-0.428
	(-0.50)
Delta house value *(age:40-55) *10^{-3}	-1.982*
	(-2.22)
Delta house value *(age>55) *10^{-3}	-2.776***
	(-5.67)
Household head's age	-242.96***
	(-5.42)
Household head's age squared*10^{-3}	2.34***
	(6.02)
Household head employee	-12.57
	(-0.06)
# of components	-1396.76***
	(-16.43)
No spouse in the household	1337.37***
	(4.69)
Household income	0.65***
	(151.15)
North	-153.53
	(-0.64)
South	3579.71***
	(14.27)
Degree	-5002.61***
	(-14.37)
College	-3126.48***
	(-14.20)
Constant	-2701.69*
	(-2.09)***

SHIW dataset: Waves 1995-2004. Observations: 11,517
Value of t statistics in parentheses
Significant at 10%,** significant at 5%; *** significant at 1%
Savings, housing values and income are expressed in 2005 Ten Thousand Euro.
Time dummy variables included

Table 3. Saving estimates with endogenous primary house wealth.

	Model Specification (1)			Model Specification (2)		
	Savings of home-owners (1)	Savings of Non-homeowners (2)	Home Ownership (3)	Savings of home-owners (4)	Savings of Non-homeowners (5)	Home Ownership (6)
Delta house value *(age<40)	-0.002			0.003		
	(-1.06)			(1.51)		
Delta house value *(age:40-55)	-0.006***			-0.003		
	(-5.65)			(-1.54)		
Delta house value *(age>55)	-0.005***			-0.004***		
	(-5.49)			(-3.29)		
Household head's age	-49.777	1.644	0.054***	-39.871	33.210	0.054***
	(-0.79)	(0.02)	(8.69)	(-0.72)	(0.47)	(8.29)
Household head's age squared	1.110*	0.368	$-0.413*10^{-3}$***	1.054*	0.117	$-0.401*10^{-3}$***
	(2.07)	(0.62)	(-6.73)	(2.25)	(0.20)	(-6.28)
Household head employee	400.427	37.739	-0.112***	9.551	-1.805	-0.099**
	(1.45)	(0.12)	(-3.69)	(0.04)	(-0.01)	(-3.12)
# of components	-1507.474***	-1118.813***	-0.066***	-1309.569***	-1127.136***	-0.064***
	(-13.12)	(-8.82)	(-5.25)	(-12.67)	(-8.86)	(-4.83)
No spouse in the household	812.799*	1031.890*	-0.155***	1018.110**	1040.221**	-0.178***
	(2.11)	(2.56)	(-3.83)	(3.02)	(2.59)	(-4.24)
Household income	0.714***	0.648***	$0.347*10^{-3}$***	0.684***	0.638***	$0.030*10^{-3}$***
	(129.34)	(38.21)	(38.94)	(98.46)	(35.42)	(29.19)
North	-934.246**	393.648	-0.167***	-1135.621***	195.201	-0.201***
	(-2.97)	(0.99)	(-4.63)	(-4.05)	(0.49)	(-5.30)
South	3726.254***	3150.274***	0.233***	3189.719***	2884.007***	0.235***
	(11.35)	(7.40)	(6.06)	(10.99)	(6.77)	(5.81)
Degree	-5206.748***	-2915.346***	-0.122*	-3215.716***	-2501.871***	-0.098

	(-11.45)	(-4.18)	(-2.07)	(-7.33)	(-3.52)	(-1.51)
College	-2693.570***	-1852.603***	0.024	-1963.497***	-1826.940***	0.030
	(-9.22)	(-5.10)	(0.70)	(-7.46)	(-5.04)	(0.84)
Price *(age<40)		1474.792***			-0.866**	
		(3.57)			(-3.26)	
Price *(age:40-55)		1096.105**			-0.926***	
		(2.88)			(-3.36)	
Price *(age>55)		1225.561**			-1.002***	
		(3.19)			(-4.03)	
House Price*10^{-3}		-0.911***				0.177*10^{-3}***
		(-3.42)				(8.76)
Council inhabitants: 20,000-40,000		-0.852**	-0.162***			-0.179***
		(-3.13)	(-4.56)			(-4.68)
Council inhabitants: 40,000-500,000		-0.815***	-0.243***			-0.283***
		(-3.30)	(-7.96)			(-8.67)
Council inhabitants: >500,000			-0.537***			-0.612***
			(-10.85)			(-11.42)
Sigma1	9.354***			9.104***		
Sigma2	8.952***			8.933***		
Rho1	0.719***			0.713***		
Rho2	-0.062			-0.017		

Model Specification (1) includes capital gains on all houses, while Model Specification (2) only on the first residence
Value of t statistics in parentheses
Significant at 10%,** significant at 5%; *** significant at 1%
Savings, housing values and income are expressed in 2005 Ten Thousand Euro.
SHIW dataset: Waves 1995-2004. Observations 11,517 (Model 1), 10,887 (Model 2).