Do more financially literate households invest less in housing? Evidence from Italy

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Using the Bank of Italy's Survey of Households Income and Wealth (SHIW) covering a 5-years panel, we measure the impact of the degree of households' financial literacy on the quota of housing investment in their portfolio. We find that households with higher levels of financial literacy hold a relatively lower share of illiquid wealth, and the results are more pronounced at older ages, when according to the lifecycle hypothesis they are meant to decumulate their wealth.

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1. Introduction

The impact of housing on the Italian economy is huge, both on a macro and on a microeconomic level: while the construction sector accounts for roughly 6 per cent of GDP, employing up to 10 per cent of the labour force (Eurostat, Statistics in Focus 7/2010), real assets represent over 60 per cent of household wealth.

Studies have shown that homeownership is related to a higher psychological well-being, better citizenship and better educational outcomes for homeowners' children (Green and White, 1997; DiPasquale and Glaeser, 1999). This may partly justify public policies, such as the relaxation of down-payment constraints and the home mortgage interest deduction, carried out in most OECD countries to encourage it (Andrews and Caldera Sànchez, 2011). A drawback of these policies is that they may lead to unbalanced portfolios with illiquid assets seizing the lion's share (Henderson and Ioannides, 1983; Brueckner, 1997); also,

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housing investment can crowd out investment in risky assets (Cocco, 2005). A broad strand of literature, starting from Shefrin and Thaler (1988), ascribes the overinvestment in illiquid assets to self-control problems: housing assets are seen as forced savings.

Many authors analyse households' portfolio including real estate investment to test for its efficiency in mean-variance terms: Brueckner (1997) and Flavin and Yamashita (2002) elaborate on the housing constraint originally introduced by Henderson and Ioannides (1983), according to which the quantity of housing owned must be at least as large as the quantity consumed: when the constraint is binding, portfolios are found to be mean-variance inefficient. Pelizzon and Weber (2009) find that homeowners could increase their returns keeping risk constant by decreasing the share of housing investment; they also find that Italian elderly are 'over housed', i.e. their dwellings are too large compared to their age related needs. Holding an excess of housing assets may turn into a hindrance at retirement age, when individuals are meant to decumulate and keep consumption smooth. Elderly individuals are more exposed to health shocks and healthcare related expenditures, and keeping most of their wealth in housing assets could translate into greater financial fragility (Lusardi and Mitchell, 2006).

Psychological and behavioural factors aside, the excessive exposure of elderly Italian households to real estate found in Pelizzon and Weber (2009) may be due to a lack of financial literacy (FL). Lusardi and Mitchell (2006) define FL as a set of tools enabling a better allocation of financial resources. It is often associated with numerical skills, or with the understanding of economic concepts such as the trade-off between risk and return, and the benefits of diversification. FL reduces information costs and positively affects stock market participation (Campbell, 2006; Christelis et al., 2010; van Rooji et al. 2011). Guiso and Jappelli (2009) show that financially illiterate households own poorly diversified portfolios, but they do not take the presence of housing into account. Fornero and Monticone (2011) find a positive effect of FL on pension plan participation and report that Italian elderly are less financially literate.

To our knowledge, the impact of a low degree of FL on housing investment has not been investigated yet. Using Italian survey data, we show that financially sophisticated households hold a more balanced portfolio, with a lower share of housing assets, and the effect appears stronger at older ages. We isolate the partial effects of FL on portfolio

imbalance by controlling for individual heterogeneity, and try to assert a causal relationship by addressing potential endogeneity of FL. Our results are robust to different specifications of FL, as well as different specifications of the dependent variable.

2. Data and Methodology

Our investigation draws from a 5 years panel dataset, Bank of Italy's Survey on Household Income and Wealth (SHIW) waves of 2006, 2008 and 2010, and the analysis is conducted at household level. We only keep households who are present in at least two waves, resulting in a panel of 14,478 observations[1] for 5,486 households. The average head of household, i.e. the household member with the highest income, is aged 58; roughly 31 per cent are females, 62 per cent are married and 43 per cent are retired (see Table 1). Over 69 per cent of head of households is a homeowner, with average net housing wealth[2] amounting to €216,447 (€158,690 for the entire sample); 90 per cent of households own at least one financial asset, most commonly bank or post office deposits, with average net financial wealth equal to €17,667.

To gauge respondents' level of FL, we follow Lusardi (2011) and exploit three survey questions regarding inflation, interest rates and a basic understanding of stocks and bonds.[3] We first create three binary variables taking the value of 1 for every correct answer for each individual, and then sum them up to build an indicator ranging from 0 to 3.

We observe that the level of FL is quite low for Italian households, since only 28.8 per cent of respondents is able to answer correctly all three questions, with the percentage of financially literate heads of household being considerably lower among the 65 years old or over (19.0 per cent vs. 32.4 per cent).

To investigate the relationship between FL and portfolio imbalance we define a new variable, housing weight (HW), as the ratio of net housing wealth over total net wealth, i.e. all real and financial wealth net of financial liabilities, such as debt or mortgages. The mean HW is 0.59 for the entire sample, or 0.64 for the 65 years old and over.

[1] Head of households younger than 18 were dropped, losing only 20 observations.
[2] Net housing wealth is calculated as the self-assessed value of respondents' first home multiplied by the fraction owned net of any mortgages - only 2.85% do not have full ownership -.
[3] Only 3,992 respondents, half of sample, are asked the FL questions in the 2006 wave.

We use the 3 waves of the SHIW, 2006, 2008 and 2010 and the following regression model [1]:

[1] $$HW_{it} = \eta_t + FL_{it}\beta_1 + x_{it}\beta_2 + c_i + u_{it}, \qquad t = 1,2,3$$

where HW_{it} is our dependent variable for individual i at time t, η_t is a separate time period intercept, $\boldsymbol{x_{it}}$ is the vector of covariates, c_i is the time-constant unobserved individual heterogeneity, and u_{it} the idiosyncratic errors. Unobserved heterogeneity c_i is treated as a random variable, and small t's are treated as aggregate time effects or different intercepts to be estimated.

The vector of covariates $\boldsymbol{x}_{it}$ includes a second order polynomial in age, the natural logarithm of household income, the natural logarithm of average regional house prices per square metre, an indicator of subjective health status, dummy variables indicating head of household female, with university degree, pensioner, marital status, region of residence, and, finally, a dummy indicating whether the head of household had inherited the house in which he or she lived. Year dummies are also included.

The first assumption we make is that idiosyncratic errors are uncorrelated with the x's and the individual heterogeneity term c_i. Since it is quite likely that $Cov(FL_{it}, c_i) \neq 0$,[4] we need to proxy the individual ability c_i in order to get consistent estimates. As proxies for c_i, we use mother and father's education i.e. dummies taking the value of one if either of them is a university graduate.

3. Results

A simple OLS regression on the pooled sample using the above proxies shows the effect of FL in terms of lower housing investment: the coefficient has a negative sign and high statistical significance (-0.02, p-value 0.000). If we run the same regression on a sub-sample of older respondents (65 years or over), we find that the correlation of FL with housing investment is even stronger in magnitude and robust to the inclusion of all different proxies (see Table 2).

We then exploit the panel dimension of our data in order to obtain consistent estimates. We can do so as long as 1) both our dependent variable (HW) and our regressor of interest

[4] c_i could represent innate individual ability or a taste for financial matters, which is very likely to be correlated with FL.

(FL) change over time, 2) c_i is constant over time and 3) errors are uncorrelated with the x's over time.

We eliminate time-invariant individual heterogeneity by de-meaning our data, to obtain

[2] $$HW_{it} - \overline{HW}_i = \left(FL_{it} - \overline{FL}_i\right)\beta_1 + \left(x_{it} - \bar{x}_i\right)\beta_2 + \left(c_i - c_i\right) + u_{it} - \bar{u}_i, \qquad t = 1,2,3$$

Equation [2] can then be estimated by fixed-effects (FE) or within estimator. By taking out time averages, time invariant individual heterogeneity c_i will disappear if and only if a strict exogeneity assumption holds.

The effect of a variation of FL on HW appears to be negative as expected; the impact is significant, but not too large in magnitude. An additional correct answer causes HW to decrease by approximately 0.009 points (-0.013 for the older sub-sample), but we must bear in mind that the FE estimator is going to suffer from attenuation bias (Angrist and Pischke, 2008), therefore the real impact of FL on HW is likely to be understated and will be addressed with an instrumental variable approach.

Among the other covariates, only a few show significant effects, which are quite intuitive: getting a divorce has strong negative impact, -0.091 for the whole sample and -0.202 for the older sub-sample; inheriting a house has a strong positive impact; entering retirement also has a positive effect, which suggests that pensioners either start decumulating financial assets, or use their severance pay to accumulate more illiquid assets (see Table 2). Interestingly, while within a cross sectional framework higher income is correlated with higher HW, the FE estimator tells us that a 1 per cent increase in income leads to a 0.033 points decrease in HW (0.06 for the over 65).

Another source of potential concern is simultaneity / reverse causation, i.e. that the variation in FL results from successive investment in stocks or improved portfolio allocation, rather than causing it. A fixed-effects instrumental variable approach can solve this problem, as well as reducing the attenuation bias from measurement error. To use the IV approach we need to identify an observable variable z_1 not present in equation [2] which is highly correlated with FL but uncorrelated with the idiosyncratic errors, u_{it}.

The OECD 2005 report on FL documents the close relationship between FL and the use of payment instruments different from cash, therefore a natural candidate to instrument the level of FL is the amount of credit/debit/cashline cards held by different households. A

second instrument is given by the presence of at least one economic graduate within the household – the graduate does not have to be a parent, it could also be a son/daughter. The F-statistic on the first stage shows that the instruments are strong; we then run a Hausman test by plugging in the residuals from the first stage in the structural regression and confirm that FL is indeed endogenous, so we proceed to estimate the model using our instruments.[5].

The results confirm the negative effect of FL on HW, and as expected, the coefficient is of an order of magnitude larger than with FE or OLS, The test of over-identifying restrictions, denoted by the Sargan statistic, implies that our instruments are valid (see Table 2).

We check for robustness using different indicators of FL: a dummy variable equal to 1 if all answers are correct and zero otherwise, and 4 different dummies for each level of FL {0,1,2,3}, with 0 correct answers as the baseline and find that the results confirm previous estimates (table not reported, but available on request) [6]. In order to exclude that the results are driven by the presence of stocks in the portfolio, we also use a different specification of HW, excluding stocks but including all bonds and other types of riskless savings, and find that the results are still robust (table not reported, but available on request).

4. Conclusions

Individuals lacking financial literacy are not empowered to make the right choices when it comes to financial matters. Our study illustrates the impact of low financial literacy on one of such choices: the proportion of wealth an investor should hold in housing assets. Policy makers have encouraged the "homeownership dream" in most OECD countries, regardless of the potential consequences of being overexposed on real estate investment.

We show that, ceteris paribus, higher levels of FL negatively affect the proportion of illiquid wealth on total net wealth, and these results are robust to potential endogeneity of the measures of FL used.

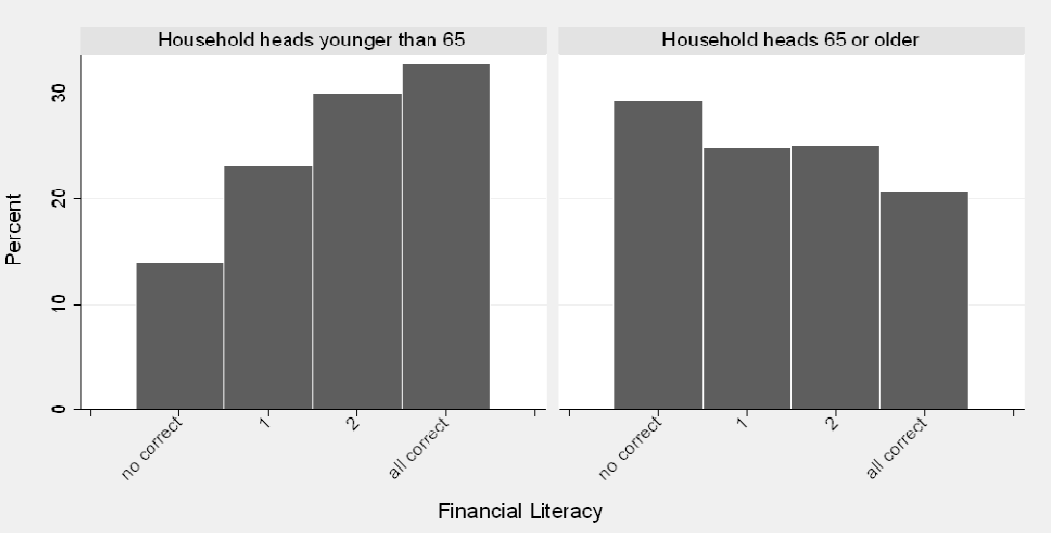
The effect of FL is stronger for the segment of the population we are more interested in: people aged 65 or over. Indeed, Italian elderly own a much larger share of housing wealth

[5] Less so for the older subsample.

[6] Interestingly, when we dichotomize the indicator of FL into 4 different dummies, we find that giving 3 correct answers has a much larger coefficient (-0.07 for the OLS, -0.03 for the FE) and higher statistical significance.

compared to younger households, and continue accumulating it after retirement, when, according to the life cycle hypothesis, they should be decumulating. Italy is also plagued by a general lack of basic knowledge of financial concepts, particularly pronounced among the over 65; policy makers could increase the levels of financial literacy with educational programmes targeting the elderly.

Figure 1: Distribution of FL by over/under 65



	No correct	1 answer	2 answers	All correct
Mean FL (<65)	14.7%	23.0%	29.9%	32.4%
Mean FL (>=65)	31.6%	24.9%	24.5%	19.0%
Mean FL (All)	20.0%	24.2%	28.5%	27.3%

Source: SHIW 2006 - 2010 – weighted data. Number of observations: 19,920.

Table 1: Descriptive statistics – regressors

Variable	# obs	Mean	Std. Dev.	Min	Max
Housing weight	14,198	0.58	0.41	0	12
Financial Literacy (0-3)	12,351	1.67	1.01	0	3
Financial Literacy (0-1)	12,351	0.28	0.45	0	1
Relative n. of cards (first IV)	14,438	0.08	1.33	-2.62	4.43
At least one economics grad. (second IV)	14,438	0.02	0.15	0	1
Age	14,438	55.44	16.44	18	102
Female	14,438	0.31	0.46	0	1
University graduate	14,438	0.10	0.30	0	1
Pensioner	14,438	0.39	0.49	0	1
Married	14,438	0.62	0.49	0	1
Single	14,438	0.16	0.37	0	1
Separated/divorced	14,438	0.07	0.26	0	1
Widow/er	14,438	0.15	0.36	0	1
Average number of children	14,438	1.64	1.25	0	20
Healthy (0-5)	14,435	3.90	0.86	0	5
Risk averse	14,438	0.49	0.50	0	1
House inherited	14,438	0.23	0.42	0	1
Log household income	14,422	10.18	0.65	2.47	13.61
Log of avg. Housing value[(a)]	14,438	7.54	0.37	6.70	8.42
Resident in the North	14,438	0.48	0.50	0	1
Resident in the Centre	14,438	0.19	0.39	0	1
Resident in the South	14,438	0.33	0.47	0	1
Mother university graduate	14,438	0.01	0.08	0	1
Father university graduate	14,438	0.02	0.15	0	1

Source: SHIW 2006 - 2010 – weighted data.

[(a)] Mean housing wealth is estimated taking the natural logarithm of housing value per square metre, by region and municipality size.

Table 2: OLS, FE and IV results

Dependent variable: housing weight – fraction of net housing wealth over total net wealth
Instrumental variable 1: difference between head of households' number of cards owned (0-5)[7] and the average by region and municipality size.
Instrumental variable 2: at least one economic graduate in the household.

	Pooled OLS		**Fixed Effects**		**IV - FE**	
	All sample b/se	**65 & over b/se**	**All sample b/se**	**65 & over b/se**	**All sample b/se**	**65 & over b/se**
FL index 0-3	-0.020***	-0.027***	-0.009***	-0.013**	-0.160**	-0.175**
	(0.00)	(0.01)	(0.00)	(0.01)	(0.07)	(0.08)
Age	0.008***	0.044**	0.004	-0.009	0.005	-0.01
	(0.00)	(0.02)	(0.00)	(0.03)	(0.00)	(0.03)
$Age^2/1000$	-0.060***	-0.298**	-0.041	0.064	-0.056*	0.049
	(0.02)	(0.13)	(0.03)	(0.19)	(0.03)	(0.19)
Single	-0.022	-0.030	-0.019	-0.017	-0.031	-0.056
	(0.02)	(0.03)	(0.03)	(0.06)	(0.03)	(0.08)
Divorced	-0.064***	-0.008	-0.090***	-0.200*	-0.077**	-0.152*
	(0.02)	(0.04)	(0.03)	(0.11)	(0.03)	(0.08)
Widow	0.028*	0.022	-0.028	-0.038	-0.043	-0.045
	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)	(0.04)
Pensioner	0.097***	0.208***	0.040***	0.101***	0.055***	0.123***
	(0.01)	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)
House inherited	0.230***	0.205***	0.178***	0.150***	0.186***	0.168***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
Log of household income	0.127***	0.110***	-0.032***	-0.058**	-0.018	-0.046**
	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)	(0.02)
Log of avg. Housing value[(a)]	-0.017	-0.015	-0.006	0.032	0.007	0.052
	(0.02)	(0.03)	(0.04)	(0.06)	(0.05)	(0.07)
constant	-0.580***	-2.255***	0.821**	1.203		
	-0.15	-0.81	-0.37	-1.43		
Proxies	YES	YES	YES	YES	YES	YES
Year and regional dummies	YES	YES	YES	YES	YES	YES
First Stage						
Cragg-Donald Wald F statistic					10.29	6.31
Angrist-Pischke underid test (chi-sq) / p-val					20.64/0.000	12.74/0.002
Anderson-Rubin Wald test (p-val)					0.029	0.013
Sargan statistic (p-val)					0.518/	0.316
P-value	0.000	0.000	0.000	0.000	0.000	0.000
R^2 / centred R^2	0.114	0.097	0.043	0.056	-0.225	-0.410
Number of observations	12,132	4,513	12,132	4,513	11,615	4,022

[(a)] Mean housing wealth is estimated taking the natural logarithm of housing value per square metre, by region and municipality size.
*The superscripts ***, **, and * indicate the 1%, 5%, and 10% levels of statistical significance, respectively.*
Clustered robust standard errors in parentheses; Unreported control variables without significant effects are: average number of children, head of household (hh) female, hh with a university degree, hh healthy (1-5 index), hh university graduate, hh risk averse.

[7] We collapsed all the outliers at 5.

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