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PRECAUTIONARY SAVING, FINANCIAL RISK, AND PORTFOLIO CHOICE

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Relying on a direct question about the desired amount of precautionary wealth from the 2002 wave of the Italian "Survey of Household Income and Wealth," I assess the main determinants of the precautionary motive for saving, focusing on the role played by financial risk on households' saving decisions. Households that invest mainly in safe assets do not need to protect themselves against future and unexpected financial losses. Consequently, once we control for households' sources of risk beside financial ones, the amount of precautionary savings of a household investing exclusively in safe assets should be lower compared to households who detain a non-negligible share of risky assets in their portfolio. Results show that, as expected, a strong and negative correlation exists between the desired amount of precautionary wealth and the ownership of a portfolio made exclusively of safe assets.

JEL Codes: C21, E21, G11

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1. Introduction

People save not only for expected rainy days, but also in prevision of unexpected contingencies (precautionary saving). As pointed out by Kimball (1993), households respond to risk by accumulating assets, especially liquid ones which can be easily sold in case an unexpected event occurs.

Moreover, when facing an additional and unavoidable risk, households tend to reduce exposure to other risks even if no significant statistical correlation exists among those risks. In this perspective, the path breaking contribution of Guiso, Jappelli and Terlizzese (1996), using a cross-section of Italian households, shows that uncertainty about future earnings makes households less prone to invest in risky assets. They argue that when facing other types of risk, people will reduce their exposure to financial risk, investing less in risky assets and more in liquid ones.

Few other papers have tried to establish a connection between saving choices and portfolio allocation (i.e. Haliassos and Bertaut, 1995; Hochguertel, 2003). At the moment, a general consensus exists on the fact that income risk tends to lower the amount of risky assets held by households. In this perspective, if income risk is not perfectly insurable, saving choices cannot be disentangled from portfolio

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decisions (Drèze and Modigliani, 1972). Uncertainty affects consumption and saving decisions as well as portfolio allocation.

Papers that investigate the importance of precautionary savings typically regress savings on a measure of earnings risk, implicitly assuming that the only risk that matters is that related to earnings. In practice, households face a multitude of risks, some insurable (such as fire or car theft) and some not (such as the risk of stock market losses).

In this paper, I examine if and how much the desired amount of precautionary wealth depends on financial market risk. Controlling for other risks beside the financial one, and for households' attitudes toward risk, I try to establish a link between portfolio composition and precautionary savings in a novel way. I exploit a question featured in the 2002 wave of the Bank of Italy's "Survey of Household Income and Wealth" (SHIW), which is patterned after a similar question in the Survey of Consumer Finances (SCF) (Kennickell and Lusardi, 2004). Italian households were asked to quantify the amount of wealth they would like to own as a preventive measure against unexpected events. This piece of information represents a household-specific measure of precautionary wealth. Moreover, it represents a step forward with respect to previous literature relating precautionary behavior to a unique source of risk—typically income risk—for households' wealth. Actually, considering income risk as the only source of risk might give rise to misleading results, thus providing a biased estimate of the precautionary motive for saving. Furthermore, using the *desired* amount of wealth instead of the *actual* one, allows us to avoid those problems related to financial market imperfections, and past negative shocks, which might affect households' saving, resulting in no wealth held for precautionary reasons.[1]

Following Kennickell and Lusardi (2004), I use the subjective measure of target wealth instead of actual wealth in order to bound the size of precautionary motive for saving. On this basis, I investigate to what extent uncertainty about future contingencies affects the amount of desired precautionary wealth. However, unlike Kennickell and Lusardi, I explicitly take into account the role of financial risk in shaping households' precautionary saving behavior. In other words, if precautionary saving is the current spending response to future risk, we need to consider to what extent the probability to lose the capital invested in relatively risky assets affects households' precautionary behavior. In this sense, this paper is similar in intent to that of Grande and Ventura (2002), who empirically found a large and positive effect of risky asset holdings on consumption variability. It is also related to the strand of literature investigating the effect of income risk on portfolio choices. However, I deviate from both strands of literature in several ways. On the one hand, using the subjective measure of precautionary wealth rather than measures of actual consumption or wealth, helps to disentangle the effect of precautionary behavior from the effect of other contingencies (i.e. negative past shocks) which may bias wealth accumulation toward zero. On the other

[1]Since wealth may be invested in risky assets, analyzing the effect of risky asset ownership on wealth holdings is kind of tautological. Assets accumulated for precautionary reasons should be characterized by high liquidity, so that they can be easily sold in case an unexpected event occurs. In this sense, using a desired measure of target wealth would help to overcome problems related to the choice of the most appropriate form of wealth to measure precautionary accumulation.

hand, I rely on the findings of Guiso, Jappelli and Terlizzese (1996), who find a strong negative relation between the amount of wealth invested in risky assets and income risk. Keeping in mind the interaction existing between labor and income risk, I go one step further, investigating the impact of both sources of risk (financial and labor-income related) on precautionary accumulation.

From this perspective, I extend Kennickell and Lusardi's (2004) analysis in two main directions. First, controlling for different sources of risk, I explicitly take into account the role played by portfolio choices in shaping households' precautionary wealth. To address the role of financial risk, I proceed in two ways. First, I empirically assess whether households whose wealth is exclusively invested in safe assets show a lower desired precautionary wealth than those who own a non-negligible share of risky assets in their portfolio. A household which invests exclusively in safe assets does not need to protect itself against future and unexpected financial losses. Consequently, controlling for attitudes toward risk, the amount of savings of a household which invests exclusively in safe assets will be lower than that of a household whose portfolio contains some risky assets.

As well as ownership of risky assets, the share of risky assets in households' portfolio should affect households' precautionary behavior. The higher the share of wealth invested in risky assets, the higher the financial risk, and therefore the need for precautionary behavior against unexpected financial losses.

Furthermore, I check whether portfolio diversification affects the amount of wealth households wish to own for precautionary reasons. Unless a perfect correlation exists between all assets, a well diversified portfolio will indeed reduce the total riskiness associated to the ownership of financial assets. To test this prediction, I use two different indices of financial diversification. The first one is simply the number of assets detained in the household's portfolio. However, such an index does not take into account the possibility that the household's wealth is unevenly invested in the portfolio. Therefore, I use an alternative index of portfolio diversification, the inverse of the Herfindahl index, which is derived as a weighted average of the wealth invested in every asset.

The empirical analysis strongly supports the hypothesis of a positive correlation between risky asset ownership and precautionary saving. Moreover, controlling for demographic and personal characteristics, I find evidence of a positive correlation between the amount of wealth invested in risky assets and the desired level of precautionary savings. However, Italian households do not seem to use portfolio diversification to reduce total exposure to risk.

Indeed, variables regarding portfolio composition may be affected by endogeneity. In other words, there may be unobservables (related to financial education, or attitudes toward risk) that may influence both the amount of desired precautionary saving and the portfolio composition. However, previous results still hold when potential endogeneity of financial variables is considered.

In the paper, I will proceed as follows. In Section 2, a brief review of the literature about precautionary saving and households' portfolio choice is presented. In Section 3, data used in the empirical analysis and some descriptive statistics are shown. In Section 4, a description of the empirical analysis based on the subjective measure of precautionary wealth is presented, and Section 5 illustrates the empirical results. In Section 6, the effects of the share of risky assets in

households' portfolio and portfolio diversification are taken into account. Section 7 concludes.

2. Brief Literature Review

A large strand of literature has pointed out a strong linkage between precautionary saving and portfolio choice. If a country is characterized by a well developed financial market, households can not only diversify appropriately their portfolio—reducing its total riskiness—but also purchase additional financial instruments against those risks which are insurable.

On the contrary, in countries characterized by a relatively low degree of financial development, households would rather save more to protect themselves against unexpected events (i.e. illness, theft, unemployment). As Guiso *et al.* (1992a) point out, a relatively low level of financial market development is indeed a good candidate for explaining Italy's high saving rate.

However, when addressing the issue of the linkage between precautionary saving and portfolio choice, the existence of significant spillovers across different sources of risk needs to be taken into account.

The existence of idiosyncratic risks that are not fully insurable (background uncertainty) may induce risk averse and prudent individuals to reduce the portfolio share of risky assets. This result can be drawn from Kimball's (1993) risk-taking theory with multiple sources of risk. Kimball's prediction is that bearing any one risk makes a risk-averse agent less willing to bear another risk, even when the two risks are independent.

Weil (1992) theoretically investigates the linkage between asset allocation and precautionary saving, using a two period model economy with both uninsurable risk and rate of return risk. He shows that if the utility function exhibits Kimball's (1993) property of standard risk aversion, precautionary saving will be predominantly allocated on the risk-free asset.[2]

Using a cross-section of Italian households, Guiso, Jappelli and Terlizzese (1996), provide an empirical assessment of the linkage between portfolio choice and background uncertainty. Using a subjective measure of earnings uncertainty, they estimate the share of risky assets in a household's portfolio. They eventually find a negative and significant correlation between earnings uncertainty and ownership of risky assets. Moreover, expectation of future borrowing constraints induces households to reduce the amount of risky and non-tradable assets in their portfolio. In this perspective, households who are already exposed to one source of risk (i.e. income risk) try to reduce their exposure to other sources of risk, even if no significant correlation exists between these risks.

Using the same subjective measure of income uncertainty, Guiso and Jappelli (1998) show that the presence of non-tradable labor risk increases the demand for insurance against (insurable) risks. Their result strongly supports the existence of spillover effects across independent risks.

[2]Standard risk aversion implies two conditions. First, the absolute holding of risky assets rises as wealth rises. Second, the absolute level of precautionary savings should decline as wealth rises.

Grande and Ventura (2002) focus on the role played by capital markets in trading away asset-specific risk from households' consumption and saving choices. Relying on Cochrane's (1991) empirical framework, they test whether consumption is fully insured against two different shocks: job loss and illness. They find Italian households to react significantly to the former, but not to the latter source of risk. More importantly, Grande and Ventura (2002) take into account the role played by financial risk in affecting households' consumption and saving choices. They found the dispersion of consumption flows across households to be positively correlated with the holding of risky assets. In this sense, even though the availability of financial instruments allows households to reduce exposure to uninsurable financial risk, asset-specific risk cannot indeed be fully traded away.

3. Data and Descriptive Statistics

Our data were taken from the 2002 wave of the SHIW, carried out biannually by the Bank of Italy. The sample includes about 8,000 households and 24,000 individuals[3] each year. The 2002 wave of SHIW features 8,011 observations. For robustness checks, pooled OLS and panel random effect analysis will be performed using the 2004 wave of the SHIW.[4] Table 1 provides some descriptive statistics regarding the main variables used in the empirical analysis.

For our purposes, the SHIW has several advantages. The survey is rich with information on household social, demographic, and economic characteristics.[5] Moreover, household portfolios are described in detail, providing us with

TABLE 1

Descriptive Statistics; Main Variables (all sample)

	Mean	S.D.	Median
Precaut	44,345.8	79,381.55	20,000
Precaut/permanent income	4.164435	64.52974	1.813623
Precaut/labor income	4.071288	45.56373	1.190476
Age	54.97169	16.11782	54
Years of education	8.740205	4.662393	8
Wealth	177,598.7	307,368.9	102,500
Real assets	158,707	274,698.7	100,000
Financial assets	23,092.36	86,840.2	6,500
Labor income	15,221.33	18,296.62	12,600

Notes: Sample statistics are estimated using SHIW population weights.

[3]See Biancotti *et al*. (2004) for a detailed description of the SHIW questionnaire, sample design, response rates, results, and comparison of survey data with macroeconomic data.

[4]Actually, some of the explanatory variables (number of credit cards, variation of financial and real wealth with respect to previous year) are not included in both waves.

[5]In the SHIW, wealthy households (who are most likely to hold sophisticated portfolios) are under-represented. However, the behavior of the upper middle class as measured in the survey is a sufficient proxy. With an appropriate functional form and sufficient variation in the observed data, the under-representation of wealthy households is only affecting estimation efficiency.

information about ownership of any one of 22 financial instruments[6] as well as the level of investment in each.[7]

Furthermore, the 2004 survey contains a question that allows us to rank households with respect to their propensity toward risk. Households' heads with financial assets other than bank or postal current accounts are asked to select their preferred financial investments among the following options:

- 1 = high risk of losing part of or all the capital, high returns
- 2 = reasonable risk losing part of the capital, good returns
- 3 = low risk of losing part of the capital, reasonable returns
- 4 = no risk for the capital, low returns.

A household is considered risk averse if it chooses the fourth alternative.[8] One of the advantages of this measure of risk aversion is that it does not rely on a particular functional form of the utility function.

This question was not asked in the 2002 survey. However, since we can assume risk aversion to be closely correlated during a two year interval, we can extend the 2004 coefficient of risk aversion to those households who were interviewed also in 2002.

Most importantly for the present study, the 2002 survey has a direct question on precautionary wealth:

> People save in various ways (depositing money in a bank account, buying financial assets, property, or other assets) and for different reasons. A first reason is to prepare for a planned event, such as the purchase of a house, children's education, etc. Another reason is to protect against contingencies, such as uncertainty about future earnings or unexpected outlays (owing to health problems or other emergencies). About how much do you think you and your family need to have in savings to meet such unexpected events?[9]

Using a similar question in the SCF, Kennickell and Lusardi (2004) described in detail the determinants of precautionary savings. Further, Jappelli *et al*. (2008) exploit the same information to directly test the buffer stock hypothesis on Italian data. It is worth noticing that the desired amount of precautionary wealth held by Italian households is much higher than the correspondent measure for U.S. households. The median ratio of target wealth to total wealth for Italian household is 0.31,

[6]See the Appendix for a detailed description of financial variables.

[7]The SHIW is characterized by a high level of under-reporting of certain asset values. As pointed out by D'Aurizio *et al*. (2006), such a problem can stem either from the interviewee's unwillingness to disclose the ownership of an asset (non-reporting) or from a wrong declared value, generally lower than the actual one (under-reporting). Under-reporting leads to a bias (the attenuation bias) which systematically biases the estimates of the coefficient toward zero, so that the empirical estimation of the coefficient associated to portfolio variables yields a reliable lower bound (in absolute value) on the actual magnitude of the relationship between desired precautionary saving and portfolio composition. Indeed, the problem of under-reporting of certain asset value in the SHIW has been recognized by several papers (e.g. Guiso *et al*., 2006; Cappelletti, 2012 among others).

[8]An alternative measure is the one used by Guiso and Paiella (2006).

[9]The Italian wording of question is: *"La gente risparmia in vari modi (mettendo soldi sul conto in banca, acquistando attività finanziarie, immobili e altri beni) e per diverse ragioni. Una prima ragione è quella di far fronte ad eventi programmati, quali l'acquisto di una casa, lo studio dei figli, ecc. Un'altra ragione è quella di tutelarsi da eventi imprevisti, quali una maggiore incertezza circa i propri guadagni futuri o spese inattese (per far fronte a problemi di salute o altre emergenze). Approssimativamente, di quanto dovrebbe disporre la Sua famiglia per far fronte a questi eventi imprevisti?"*

and 3.32 if wealth includes only financial assets. With regard to U.S. households, Kennickell and Lusardi (2004) report instead 0.08 and 0.2, respectively. As Jappelli *et al*. (2008) point out, that difference may be imputed to a higher degree of income variability in Italy and a lower degree of development of Italian financial markets.[10]

The reported amount of wealth can be considered as the target wealth desired by buffer-stock savers. Buffer-stock savers have indeed a target wealth-to-permanent-income ratio such that, if wealth is below the target, the precautionary saving motive will dominate impatience and consumers will save, while if wealth is above the target, impatience will dominate prudence and consumers will reduce savings (Carroll, 1997).

Using this measure of *desired* wealth instead of *actual* wealth, as done by previous literature, provides a better way to elicit the extent of precautionary accumulation. First, households in the past might have borne negative shocks, depleting the wealth they eventually held for precautionary reasons. As a consequence, households who exhibit very low levels of wealth are not necessarily those who do not have a precautionary motive for saving. It may simply be that these households have faced negative shocks in the past. Second, using a subjective and household-specific measure of desired precautionary saving is helpful in order to circumvent all these problems related to borrowing possibilities, unobservable preferences, and formal and informal insurance schemes (Kennickell and Lusardi, 2004).[11] Finally, this piece of information provides us with a comprehensive measure of risk, including not only income risk, but also all possible sources of risk perceived by households. Actually, previous literature only deals with one specific source of risk, particularly income risk (see Guiso, Jappelli and Terlizzese, 1992b; Lusardi, 1998). Some contributions (e.g. Guiso, Jappelli and Pistaferri, 1998) show a relation existing between the two different sources of risk (i.e. income risk and financial risk), empirically showing that exposure to one source of risk reduces exposure to the other, even if the two risks are not correlated.

Using the subjective measure provided by the SHIW allows us to go one step further than previous literature. On the one hand, it enables us to take into account sources of risk other than income risk. Households reduce exposure to unavoidable risk by reducing exposure to other risks, even when the other risks are statistically independent of the first (Kimball, 1993). Using a household-specific measure of desired precautionary saving, it is indeed possible to control for different sources of risk, checking the relative weight of each source on households' precautionary behavior.

[10]Italy and the U.S. differ profoundly as far as participation in financial markets is concerned. Actually, households' portfolio composition depends not only on personal characteristics, such as wealth, age, and attitudes toward risk, but also on supply-side features, such as the availability of financial instruments and transaction costs. Empirical works highlighted substantial differences in this sense between Italy and the U.S. (Bertaut and Starr-McCluer, 2000; Guiso and Jappelli, 2002). Italian households are found to hold a lower percentage of stocks, compared to their U.S. counterparts, and a less diversified portfolio. This result also holds for the majority of Italian households in the top 5 percent of the wealth distribution, who are found to have no direct or indirect stock holding. This puzzling difference may be due, in part, to some combination of national differences in households' background risk, in information and other entry costs (Guiso and Jappelli, 2000).

[11]Actually, as Kennickell and Lusardi (2004) point out, using this subjective measure is not free from measurement errors. For example, households may not fully understand the question. However, the authors notice that this is a problem related to all research which uses subjective measures.

As far as the definition of risky asset is concerned, following Guiso, Jappelli and Pistaferri (1998), and Bertocchi *et al.* (2009), I use two main definitions of risky assets. The narrow definition includes stocks, corporate bonds, foreign assets, and shares in limited liabilities companies. According to the broad definition, long-term government bonds and investment funds are also included among risky assets even though, as pointed out by Bertocchi *et al.* (2009), long-term government bonds and investment funds can be considered fairly safe. Indeed, investment funds are a form of managed investment characterized by high diversification, and since the post-1996 fiscal stabilization, it is possible to attach a relatively low risk to long-term government bonds as well (Guiso and Jappelli, 2002).

In order to detect household portfolio composition, we first need to take into account whether a household owns any risky asset in their portfolio.

Two dummies are introduced, *port_safe1* and *port_safe2*. They take the value 1 if the portfolio is exclusively made of safe assets, and the value 0 if the household owns at least one of the securities classified as risky, according to the broad definition (port_safe1) or to the narrow one (port_safe2). The weight of risky assets in the portfolios, as well as their ownership, is of interest. The two variables *share_narrow* and *share_broad*, which are calculated as the share of risky asset (according to the broad and narrow definition, respectively) are introduced to take this into account.

Table 2 presents some descriptive statistics of the desired precautionary savings, as well as the ratio precautionary savings/permanent income, by demographic and financial variables.

The desired amount of precautionary savings tends to be higher for middle-aged households, and for those who live in the centre-north. As expected, married individuals—who care about unexpected events which may occur not only to themselves, but also to their spouse—show a higher precautionary motive for saving than single people. As far as job status is concerned, self-employed households—who take into account the possibility of losses in their business—show a higher amount of desired precautionary saving than wage earners.

When attitudes toward risk are taken into account, we can notice that risk adverse households exhibit a higher ratio of precautionary savings/permanent income than risk lover ones.[12]

Households whose portfolios are made exclusively of safe assets report a lower desired precautionary wealth than households who own risky assets. Ownership of risky assets implies a non-negligible financial risk. Therefore, households might perceive a higher risk, and feel the need to have a higher amount of wealth to face unexpected contingencies.

Finally, the role played by liquidity constraints is taken into account, by taking into consideration two different definitions of constraints. The first one relies on a specific question present in the SHIW. According to this first definition, a household is constrained if its request for a loan was rejected, or if it was discouraged from asking for a loan but wished to apply for one. The second definition is the traditional and widespread definition proposed by Hayashi (1985):

[12]This is in line with Kimball and Weil (2009) who analytically show that greater risk aversion tends to increase the strength of the precautionary saving motive.

TABLE 2

Desired Precautionary Saving; Descriptive Statistics
(average values)

	Precaut	Precaut/YP
Age class		
<30	35,212.14	5.288539
31–40	51,221.94	10.07616
41–50	52,002.71	3.712609
51–65	49,883.18	2.24675
>65	30,855.11	3.861782
North	53,575.33	4.048967
Centre	54,120.9	5.126186
South	25,725.69	3.754108
Married	49,580.189	5.178626
Single	34,209.43	2.200459
Education		
Primary school	28,750.46	2.020019
High school	50,406.17	5.623866
Undergraduate or more	73,129.48	3.584275
Job status		
Unemployed	36,793.82	4.44081
Self-employed	64,039.2	4.723714
Dependent job	48,484.04	4.723714
1^wealth quartile	32,982.82	5.760568
2^wealth quartile	30,483.16	2.719051
3^wealth quartile	46,915.17	2.746094
4^wealth quartile	75,222.63	5.625952
Risk averse	42,237.83	4.06405
Risk lover-neutral	56,163.8	3.684384
Liquidity constraints (1^def)		
Constrained	35,937.74	5.061201
Unconstrained	53,088.85	5.287624
Liquidity constraints (2^def)		
Constrained	31,978.05	7.6921119
Unconstrained	45,863.57	3.731517
Home ownership		
Owns home	46,653	3.267529
Do not own home	39,334.48	6.11254
Portfolio composition—narrow def.		
Only safe assets	39,838.711	3.980443
Risky asset ownership	83,716.581	6.130957
Risky asset ownership—broad def.		
Only safe assets	81,558.296	5.963333
Risky asset ownership	39,279.324	3.964644
Whole sample	44,345.8	4.071289

Notes: This table shows average values of the desired amount of precautionary saving (*precaut*) and precautionary saving scaled by permanent income (*precaut_y*), by several population groups. Sample statistics are estimated using SHIW population weights.

a household is constrained if its wealth is greater than 6 months' income.[13] Insignificant differences in the ratio of precautionary saving/permanent income are

[13]As Jappelli *et al*. point out, there is not a monotonic relation between net wealth and the probability to be constrained. However, Hayashi's definition gives a good approximation of those who are going to be constrained.

found when the first definition is taken into account. Households who are constrained according to Hayashi's definition, are found instead to have higher precautionary saving compared to unconstrained ones.

This is in line with Carroll and Kimball (2001), who show analytically that the introduction of a liquidity constraint increases the precautionary saving motive around those levels of wealth where the constraint becomes binding.

Table 3 presents some descriptive statistics regarding the index of portfolio diversification. In the empirical analysis, two different financial diversification indices will be used.

The first one is simply the inverse of the Herfindahl index, and it is calculated as:

$$div\_index = 1 - \sum_{i=1}^{N} (w_i)^2,$$

where N is the total number of assets in the portfolio, whereas w_i is the weight of asset i in the household's portfolio. An index of portfolio diversification close to one means high diversification, whereas an index close to zero means a portfolio concentrated in one or a few assets. As explained in the Appendix, *div_index*1 is calculated including all 22 financial assets. *div_index*2 and *div_index*3 are instead calculated when only risky assets—defined in a narrow and in a broad sense, respectively—are included.

The second index, *ndiv_index*, is simply the number of assets households own in their portfolios. As for *div_index*, three indexes will be used in the analysis, depending on whether all financial assets (*ndiv_index1*), risky assets in a narrow sense (*ndiv_index2*), or risky assets in a broad sense are included (*ndiv_index2*). Since this measure does not allow the distribution of assets in the portfolio to be taken into account, in the empirical analysis I rely mostly on *div_index*, using *ndiv_index* as further robustness checks.

As Table 3 shows, Italian households seem to hold quite undiversified portfolios. When div_*index* is used, the value of the diversification index averages around 15 percent. When *n*div_*index* is used, previous results are confirmed. On average, Italian households own less than two financial assets in their portfolio.

Table 4 shows the number of assets owned by Italian households, considering all assets, risky assets in a broad sense, and risky assets in a narrow sense, respectively. Only a small percentage of households own more than three assets in their portfolio.

TABLE 3

Diversification Index; Descriptive Statistics

	Mean	Min	Max	No. Obs
div_index1	0.20520	0	0.85459	6548
div_index2	0.16223	0	0.78402	1581
div_index3	0.15633	0	0.83341	2778
ndiv_index1	2.034264	1	11	6548
ndiv_index2	1.475179	1	6	1581
ndiv_index3	1.53697	1	8	2778

Notes: Sample statistics are calculated using SHIW population weights.

TABLE 4

NUMBER OF ASSETS (*NDINDEX1*)

	Number of Assets in the Portfolio	Frequency
NDINDEX1		
1	2999	45.80%
2	1750	26.73%
3	979	14.95%
4	447	6.83%
5	220	3.36%
6	101	1.54%
7	26	0.40%
8	18	0.27%
9	4	0.06%
10	3	0.05%
11	1	0.02%
Total	6548	
NDINDEX2		
1	1030	65.15%
2	381	24.10%
3	130	8.22%
4	34	2.15%
5	5	0.32%
6	1	0.06%
Total	1581	
NDINDEX3		
1	1793	64.54%
2	625	22.50%
3	226	8.14%
4	92	3.31%
5	33	1.19%
6	7	0.25%
7	1	0.04%
8	1	0.04%
Total	2778	

Notes: Sample statistics are estimated using SHIW population weights.

Results from descriptive statistics are in line with the strand of literature about the "non-participation puzzle" (Mankiw and Zeldes, 1991; Haliassos and Bertaut, 1995; Guiso and Jappelli, 2005), according to which transaction and information costs severely limit stockholding.

4. EMPIRICAL ESTIMATION

Following Kennickell and Lusardi (2004), I estimate the determinants of desired precautionary savings, taking into account several possible reasons that may lead households to save for precautionary reasons. However, I go one step further by explicitly taking into account the effect of portfolio composition on precautionary wealth.

On the one hand, I argue that ownership of risky assets would represent an additional reason for saving. Therefore, households whose portfolio is made exclusively of safe assets should have a lower desired precautionary wealth with respect

to those households who own risky assets in their portfolio. On the other hand, I take explicitly into account the role of portfolio diversification in reducing households' total exposure to financial risk. In this perspective, assuming no correlation between asset returns, a well diversified financial portfolio should reduce desired precautionary saving.

In order to assess these two claims, I follow closely the empirical specification proposed by Kennickell and Lusardi (2004) and Guariglia (2001). The log of desired precautionary saving scaled by permanent income is used as a dependent variable, $(\ln(precant\_y)_i$. The logarithm of permanent income is included in the right-hand side. Permanent income, defined as the annualized value of individual human wealth, is calculated following the procedure proposed by Guiso *et al.* (1992b).

There is evidence that saving varies across levels of permanent income (Carroll and Samwick, 1998; Guariglia, 2001). Including permanent income as an explanatory variable, we allow preferences to be non-homothetic.

The following regression is therefore estimated:

$$\ln(precaut\_y)_i = \alpha + \beta \ln(perm.income)_i + port\_safe_i + \mathrm{var}_i + \delta DEM_i + \gamma FIN_i + \varepsilon_i,$$

where $port\_safe_i$ is a dummy which takes the value 1 if households own exclusively safe assets in their portfolios, and 0 if they own at least one risky asset. var_i represents the logarithm of labor income variance, calculated over six waves of the SHIW. It is included in the estimation in order to control for earnings variability.[14]

DEM and *FIN* are respectively a set of financial variables that may affect the desired amount of precautionary savings. The set of demographic indicators includes age, age squared, education, education squared, 21 geographical dummies, a dummy for civil status, and occupational dummies. As far as financial variables are concerned, two dummies indicating whether households exhibit a positive variation in their financial and real wealth with respect to the previous year are included. This helps to control for previous shocks in wealth which may affect the declared amount of desired precautionary wealth. Moreover, a dummy for house ownership is included. House ownership may indeed represent a good "safety net" in case of unexpected events, affecting therefore the amount of wealth households would need to detain to face sudden drops in their income. Furthermore, credit card ownership is also included in the estimation. Ownership of one or more credit cards, by allowing households to postpone expenses to the future, might indeed represent a good indicator of households' spending target. Finally, a dummy which indicates whether the household received help from parents or friends is included in the regression. As pointed out by Guiso and Jappelli (1991), such informal networks might indeed help households to overcome borrowing constraints. In this perspective, help from relatives represents an alternative to insurance schemes or savings to protect themselves against uninsurable risks.

[14]Following Guariglia (2001), three panel measures of earnings variability are calculated (see the Appendix for further details). In the empirical estimation I use *var*3, because it drops a smaller number of observations. However, using alternative measures of earnings variability does not change the results.

Finally, the length of relationship with the bank is included in the estimation as a proxy for financial education. Having a long-term relationship with a bank might indeed increase the possibility that the household prefers to insure against unexpected losses using formal insurance schemes, or to diversify its portfolio in order to reduce exposure to financial risk. Finally, wealth quartile dummies are included, in order to control for the level of wealth.[15]

5. Results

Tables 5 and 6 present the estimation results using *port_safe*1 and *port_safe*2, respectively. Precautionary saving is significantly higher for those aged between 40 and 50, and for households belonging to the highest wealth quartile. Looking at *port_safe*1 and *port_safe*2, we notice that they are both negative and significant at the 1 percent level. As expected, having a portfolio made exclusively of safe assets significantly reduces households' desired precautionary wealth. In this perspective, asset related risk represents a non-negligible determinant of precautionary saving.

As well as financial risk, earnings risk represents a non-negligible source of precautionary accumulation. Earnings risk is positive and significant at the 10 percent level.

In order to control for households' attitudes toward risk, a dummy which takes the value 1 if the household is risk averse is included in the estimation (specification (3)); the dummy is derived from a specific question present in the 2004 wave of the SHIW. Since only households who were interviewed in the 2004 and 2002 waves of the SHIW were included, the sample size shrinks to 1,006 observations. Even controlling for risk aversion, previous results do not change.

In order to control for the regional level of financial development, the number of bank branches in a region is included in specification (4) instead of regional dummies. Intuitively, the higher the financial development of a certain region, the more households would rely on market-based instruments (i.e. insurance, portfolio diversification)—instead of precautionary savings—to insure themselves against unexpected losses. Furthermore, it might be that not only the number, but also the diversification of financial intermediaries could affect households' demand for financial services. In order to control for the latter effect, an interaction term between the number of bank branches and four dummies for town size are included.[16] The total effect of the number of bank branches is positive and significant, but it assumes a negative value for those households living in a municipality with more than 500,000 inhabitants.

As expected, when the working sub-sample is taken into account (specification (2)), earnings variability becomes greater and more significant.[17] Moreover, in order to control for health risk, a variable indicating the number of illness days is

[15]See the Appendix for a complete description of all variables used in the empirical analysis.

[16]Data come from the Bank of Italy "Base Informativa Pubblica."

[17]The fact that income risk is not significant in the whole sample does not contradict the strand of literature which found evidence in favor of precautionary saving using effective or subjective measures of income variance. Obviously, labor income risk is not likely to affect the behavior of retired and unemployed households.

TABLE 5

OLS Estimation Using port_safe1

Dependent variable: ln(precaut_y)					
	(1)	(2)	(3)	(4)	(5)
ln(YP)	–0.948***	–1.022***	–0.789***	–0.873***	–0.959***
	(0.119)	(0.139)	(0.123)	(0.189)	(0.0310)
port_safe1	–0.321***	–0.244**	–0.415***	–0.245***	–0.253***
	(0.0923)	(0.117)	(0.0944)	(0.0899)	(0.0536)
Var(Y) · 1000	0.0691*	0.0704	0.0870*	0.0678*	–0.00305
	(0.0417)	(0.0487)	(0.0449)	(0.0357)	(0.0395)
Age	0.0327	0.104***	0.0353	0.0557	0.0457***
	(0.0223)	(0.0334)	(0.0231)	(0.0364)	(0.0143)
Age^2	–0.000307	–0.00100***	–0.000340	–0.000528	–0.000420***
	(0.000199)	(0.000315)	(0.000207)	(0.000373)	(0.000126)
Education	0.0703**	0.0432	0.0992***	0.00614	0.0426**
	(0.0328)	(0.0495)	(0.0348)	(0.0480)	(0.0190)
Education^2	–0.00180	–0.00118	–0.00348**	0.000242	–0.000591
	(0.00148)	(0.00222)	(0.00158)	(0.00200)	(0.000886)
Income_recip	–0.0870	0.0295	–0.0487	–0.142	–0.0812
	(0.0996)	(0.129)	(0.103)	(0.102)	(0.0550)
Farmer	–0.0631	–0.0519	–0.240	–0.141	–0.0644
	(0.186)	(0.290)	(0.213)	(0.176)	(0.151)
Self_employed	0.141	0.166	0.0480	0.0627	0.0836
	(0.0993)	(0.156)	(0.108)	(0.0867)	(0.0742)
Family_size	0.0817**	0.0740	0.0108	0.0941**	0.0741***
	(0.0403)	(0.0581)	(0.0407)	(0.0445)	(0.0249)
II wealth quartile	0.471***	0.401	0.529***	0.421***	0.412***
	(0.137)	(0.250)	(0.148)	(0.142)	(0.0857)
III wealth quartile	0.600***	0.454*	0.663***	0.161	0.551***
	(0.158)	(0.265)	(0.169)	(0.165)	(0.0971)
IV wealth quartile	0.778***	0.700**	0.871***	0.464***	0.698***
	(0.173)	(0.284)	(0.183)	(0.173)	(0.103)
Home_owner	–0.230*	0.0223	–0.316**	–0.0849	–0.145*
	(0.125)	(0.226)	(0.132)	(0.124)	(0.0781)
Help from parents	0.201	0.314	0.136	–0.0173	0.0461
	(0.292)	(0.335)	(0.339)	(0.239)	(0.150)
Credit_card	0.129	0.239**	0.172**	0.162**	
	(0.0820)	(0.120)	(0.0849)	(0.0788)	
Real_variation	0.719	–0.243	0.310	–0.133	
	(0.649)	(0.277)	(0.559)	(0.643)	
Financial_variation	–0.591	0.322*	–1.039**	0.454*	
	(0.467)	(0.173)	(0.507)	(0.250)	
Bank branches			4.468		
			(2.729)		
Bank_branches*			4.069***		
20,000< inhab. <40,000			(1.439)		
Bank_branches*			0.540		
40,000< inhab. <500,000			(1.452)		
Bank_branches*			–5.802**		
inhab >500,000			(2.487)		
Risk_aversion		0.0632			
		(0.106)			
Days_ill				0.00185	
				(0.00179)	
Year = 2004					0.351***
					(0.0528)
Constant	1.472**	–0.0374	0.684	1.059	1.347***
	(0.683)	(0.921)	(0.711)	(0.892)	(0.430)
Observations	2984	1006	2984	1367	4500
R^2	0.206	0.259	0.124	0.174	
No. of observations					2999

Notes: Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

TABLE 6

OLS Estimation Using port_safe2

Dependent variable: ln(precaut_y)					
	(1)	(2)	(3)	(4)	(5)
ln(YP)	–0.949***	–1.022***	–0.790***	–0.802***	–1.020***
	(0.120)	(0.139)	(0.123)	(0.228)	(0.0592)
port_safe2	–0.306***	–0.277**	–0.411***	–0.341***	–0.262***
	(0.0937)	(0.120)	(0.0968)	(0.114)	(0.0782)
Var(Y)·1000	0.0680	0.0686	0.0853*	0.0964**	0.0674*
	(0.0419)	(0.0489)	(0.0451)	(0.0436)	(0.0376)
Age	0.0339	0.107***	0.0369	0.0782*	0.0547
	(0.0223)	(0.0333)	(0.0231)	(0.0448)	(0.0341)
Age^2	–0.000315	–0.00103***	–0.000352*	–0.000824*	–0.000513
	(0.000199)	(0.000314)	(0.000207)	(0.000456)	(0.000355)
Education	0.0709**	0.0445	0.100***	–0.00166	0.00161
	(0.0329)	(0.0496)	(0.0349)	(0.0676)	(0.0448)
Education^2	–0.00178	–0.00122	–0.00347**	0.000205	0.000892
	(0.00148)	(0.00223)	(0.00159)	(0.00283)	(0.00185)
Income_recip	–0.0863	0.0317	–0.0473	–0.169	–0.180**
	(0.0997)	(0.130)	(0.103)	(0.137)	(0.0869)
Farmer	–0.0653	–0.0480	–0.242	–0.156	–0.222
	(0.186)	(0.289)	(0.213)	(0.212)	(0.160)
Self_employed	0.136	0.161	0.0408	0.192*	0.0845
	(0.0992)	(0.156)	(0.108)	(0.112)	(0.0801)
Family_size	0.0806**	0.0700	0.00909	0.0794	0.0981***
	(0.0403)	(0.0582)	(0.0408)	(0.0587)	(0.0345)
II wealth quartile	0.472***	0.396	0.528***	0.359**	0.415***
	(0.137)	(0.251)	(0.149)	(0.162)	(0.131)
III wealth quartile	0.605***	0.451*	0.667***	0.183	0.293**
	(0.158)	(0.266)	(0.169)	(0.202)	(0.149)
IV wealth quartile	0.791***	0.696**	0.882***	0.393*	0.530***
	(0.173)	(0.285)	(0.183)	(0.219)	(0.156)
Home_owner	–0.228*	0.0283	–0.311**	–0.0936	–0.111
	(0.126)	(0.227)	(0.133)	(0.137)	(0.113)
Parents	0.205	0.325	0.142	0.0677	0.00259
	(0.292)	(0.337)	(0.340)	(0.293)	(0.214)
Credit_card	0.135	0.236*	0.178**	0.171*	
	(0.0825)	(0.122)	(0.0852)	(0.0980)	
Real_variation	0.769	–0.234	0.376	0.532	
	(0.627)	(0.276)	(0.548)	(0.547)	
Financial_variation	–0.618	0.307*	–1.075**	0.157	
	(0.463)	(0.172)	(0.512)	(0.448)	
Bank_branches			4.550*		
			(2.738)		
Bank_branches*			4.092***		
20,000< inhab. <40,000			(1.443)		
Bank_branches*			0.525		
40,000< inhab. <500,000			(1.454)		
Bank_branches*			–5.934**		
inhab >500,000			(2.487)		
Risk_aversion		0.0628			
		(0.107)			
Days_ill				0.000271	
				(0.00222)	
Year = 2004					0.195
					(0.125)
Constant	1.428**	–0.0680	0.630	0.704	1.543*
	(0.677)	(0.894)	(0.704)	(1.112)	(0.858)
Observations	2984	1006	2984	1367	1780
R^2	0.206	0.260	0.119	0.170	
Number of nquest					1385

Notes: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Each regression includes 21 regional dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

introduced in specification (4) as explanatory variable. As expected, it is found to positively affect households' precautionary saving, though it is not significantly different from zero. From this perspective, the Italian public health system appears to lessen the need to save for future illness.

Finally, in specification (5) of Tables 5 and 6, random effect panel estimation is performed using the 2002 and 2004 waves of the SHIW. Previous results regarding financial risk significance remain basically unaffected. Moreover, earnings risk is significant at the 10 percent level.

5.1. *Endogeneity Issues*

In the previous section, ownership of risky assets was found to be strongly correlated with desired precautionary saving. However, OLS regression might be plagued by an endogeneity problem. First, risky asset ownership is correlated with unobserved factors, possibly related to financial literacy and attitudes toward risk, which also affect the reported amount of precautionary saving. Intuitively, households with a relatively high level of knowledge of financial markets would probably use insurance schemes to protect against insurable risks (i.e. death, illness, damage to property). Further, they would adequately diversify their portfolio, so that overall financial risk is reduced.

Second, the decision to own risky assets strongly depends on households' perception of future unexpected events. In this sense, a household might not invest in risky assets because it needs a higher amount of wealth to face unexpected events. Similarly, a household may diversify its portfolio because a high amount of wealth is already needed to face other risks.

Previous estimation results should therefore be re-estimated using instrumental variables. However, the choice of plausible instruments for the endogenous variable is somewhat tricky. We can assume the decision to invest in risky assets to be correlated with the knowledge of such instruments. As shown by Guiso and Jappelli (2005), financial instruments awareness is strongly and positively correlated with education, household resources, long-term bank relations, and proxies for social interaction.

In Table 7, education and the length of relationship with the bank are used to instrument *port_safe*1 and *port_safe*2.[18] Indeed, *port_safe*1 and *port_safe*2 are negative and significant at the 1 percent level, even when the endogeneity issue is taken into account.

Moreover, *dummy_help* is negative and significant at the 5 percent level. This proves the strength of "informal networks" among Italian households. Receiving help from relatives represents a "safety net" against unexpected events, significantly reducing households' need to save for precautionary reasons.

These results still hold when random effect panel estimation is performed (Table 8).

In Table 9, *port_safe*1 and *port_safe*2 are instrumented using years of education, the length of the relationship with the bank, and a risk aversion indicator,

[18]We tried to include parental level of education as an additional instrument. Results are basically unchanged.

TABLE 7
IV Estimation

Dependent variable: ln(precaut_y)		
	(1)	(2)
port_safe1	–1.888***	
	(0.635)	
port_safe2		–2.036***
		(0.694)
ln(YP)	–0.785***	–0.781***
	(0.129)	(0.130)
Var(Y)	0.000429	–0.00781
	(0.0735)	(0.0790)
Age	0.0442	0.0437
	(0.0335)	(0.0334)
Age^2	–0.000427	–0.000413
	(0.000311)	(0.000310)
Family_size	0.0724	0.0594
	(0.0537)	(0.0543)
Income_recip	0.0731	0.0915
	(0.144)	(0.145)
Farmer	0.142	0.155
	(0.343)	(0.348)
Self_employed	–0.0387	–0.0503
	(0.153)	(0.154)
II wealth quartile	–0.150	–0.186
	(0.199)	(0.206)
III wealth quartile	–0.0499	–0.0691
	(0.261)	(0.264)
IV wealth quartile	–0.124	–0.141
	(0.352)	(0.360)
Credit_card	–0.163	–0.113
	(0.165)	(0.153)
Real_variation	–0.458	0.754**
	(0.580)	(0.353)
Financial_variation	0.469	–0.0443
	(0.415)	(0.192)
Home_owner	0.243	0.271
	(0.167)	(0.170)
Parents	–0.743***	–0.775***
	(0.284)	(0.296)
Constant	3.086***	3.305***
	(1.080)	(1.139)
Instruments:		
Years of education, length of the relationship with the bank		
Test of overidentifying restrictions (p-value):		
	0.9633	0.9859
Weak identification test (Kleibergen–Paap rk Wald F statistic)		
	14.664	12.727
Observations	1324	1324
R^2	0.046	0.077

Notes: Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

TABLE 8
IV Estimation, Panel

Dependent variable: ln(precaut_y)		
	(1)	(2)
port_safe1	–1.602***	
	(0.438)	
port_safe2		–1.845***
		(0.515)
ln (YP)	–0.977***	–0.968***
	(0.0487)	(0.0491)
Var(Y) ·1000	–0.0228	–0.0367
	(0.0419)	(0.0438)
Age	0.0511**	0.0522**
	(0.0207)	(0.0211)
Age^2	–0.000457**	–0.000463**
	(0.000184)	(0.000188)
Family_size	0.0949***	0.0780**
	(0.0346)	(0.0354)
Income_recip.	–0.00374	–0.00756
	(0.0775)	(0.0791)
Farmer	–0.221	–0.251
	(0.270)	(0.275)
Self_employed	–0.0320	–0.0387
	(0.114)	(0.116)
II wealth quartile	0.135	0.104
	(0.147)	(0.154)
III wealth quartile	0.225	0.213
	(0.176)	(0.181)
IV wealth quartile	0.153	0.117
	(0.235)	(0.248)
Home_owner	0.102	0.119
	(0.125)	(0.129)
Parents	–0.229	–0.223
	(0.221)	(0.225)
Year = 2004	0.223**	0.257***
	(0.0898)	(0.0909)
Constant	2.768***	3.003***
	(0.734)	(0.789)
Observations	2002	2002
Number of nquest	1403	1403

Notes: Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies, and 4 city size dummies (not reported for brevity). port safe1 and port_safe2 are instrumented using household head's years of education and the length of relationship with a bank.

which turns out to be strongly correlated with ownership[19] of risky assets. Even in this case, portfolio ownership dummies are found to be negative and strongly significant.

6. Precautionary Saving and Portfolio Diversification

So far we have addressed the linkage between precautionary savings and portfolio diversification in the simplest possible way, analyzing whether ownership

[19]See the Appendix for the result of first stage regression.

TABLE 9
IV Regression Using Alternative Instruments

Dependent variable: ln(precaut_y)		
	(1)	(2)
port_safe1	−1.345***	
	(0.410)	
port_safe2		−1.549***
		(0.500)
ln(YP)	−1.043***	−1.043***
	(0.0502)	(0.0522)
Var (Y) · 1000	0.0285	0.00758
	(0.0628)	(0.0656)
Age	0.0627*	0.0621*
	(0.0324)	(0.0329)
Age^2	−0.000543*	−0.000526*
	(0.000290)	(0.000296)
Family_size	0.114**	0.0896
	(0.0553)	(0.0578)
Income_recip.	−0.0600	−0.0858
	(0.120)	(0.128)
Farmer	0.673	0.579
	(0.555)	(0.558)
Self_employed	−0.187	−0.177
	(0.176)	(0.179)
II wealth quartile	0.0521	−0.0309
	(0.238)	(0.250)
III wealth quartile	0.0511	0.00708
	(0.271)	(0.280)
IV wealth quartile	0.111	0.0543
	(0.320)	(0.340)
Home_owner	0.361*	0.362*
	(0.206)	(0.204)
Parents	0.0423	−0.0609
	(0.326)	(0.347)
Constant	2.216**	2.539**
	(1.063)	(1.156)
Instruments:		
Education, length of relationship with the bank, risk aversion		
Test of overidentifying restrictions (p-value):		
	0.2073	0.1687
Weak identification test (Kleibergen–Paap rk Wald F statistic)		
	15.1013	10.9898
Observations	868	868
R^2	0.429	0.354

Notes: Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

of relatively risky assets affects households' saving for unexpected contingencies. However, taking into account the ownership of risky assets is only one side of the coin.

What matters is not just the fact of holding risky assets, but their weight compared to the overall wealth held. Households might indeed exploit portfolio

diversification in order to reduce their portfolio's total riskiness. As Mauro (1995) pointed out, the introduction of a well developed stock market allows households to pool risks, with a consequent reduction of precautionary saving. From this perspective, the influence of portfolio diversification on households' desired precautionary saving is twofold. On the one hand, financial instruments should help to smooth consumption over time and across contingencies. On the other hand, they seem to convey sector-specific shocks that the holder might not diversify as fully as desired (Grande and Ventura, 2002).

Tables 10 and 11 show the results of the instrumental variable estimation. As well as ownership of risky assets, the share of risky assets, and portfolio diversification indices should be treated as endogenous variables. A simultaneity issue indeed exists. Households might detain a relatively low share of risky assets as well as a highly diversified portfolio in order to reduce the amount of desired precautionary wealth.

Since households' propensity to diversify their portfolio is not only related to their attitudes toward risk, but is also correlated to the level of education and financial literacy, the level of education and years of relationship with a bank seem plausible instruments for a diversification index. Table 10 shows results of IV regression using years of education and the length of the relationship with a bank as instruments, whereas in Table 11 risk aversion is used as additional instrument. Results show that a relatively larger share of risky assets in one's portfolio increases the precautionary motive for saving.

However, Italian households do not seem to use portfolio diversification to protect themselves against financial risk. Using both indices, the sign of the coefficient associated to the diversification index is positive and significant. A higher level of diversification increases households' desired precautionary saving. This result is in line with Grande and Ventura (2002): although a higher diversification helps to reduce a portfolio's total riskiness, risky assets convey sector specific shocks, giving rise to higher precautionary savings.

7. Conclusion

In this paper I have explored how saving decisions of Italian households respond to asset-related risk, using a household specific measure of desired precautionary wealth in the empirical analysis. The advantage of using a self-reported measure of precautionary wealth is twofold. First, it is a comprehensive measure, which includes all possible sources of risk. Second, it helps to avoid problems related to past shocks in household wealth, which might shrink households' effective resources, giving rise to a low or null amount of wealth detained for precautionary reasons.

The empirical results show that Italian households appear to desire to have precautionary holdings in amounts that are related to financial risk. Estimates show that owning a portfolio made exclusively of safe assets strongly and significantly reduces the amount of precautionary saving households wish to detain to face unexpected contingencies. In this perspective, risky asset ownership is perceived as a non-negligible source of risk. This result is robust to alternative specifications (i.e. self-employed and older households).

TABLE 10

IV Estimation; Portfolio Diversification

Dependent variable: ln(precaut_y)				
	(1)	(2)	(3)	(4)
share_broad	4.361***			
	(1.415)			
share_narrow		5.846***		
		(2.079)		
dindex1			4.606***	
			(1.593)	
ndindex1				0.910***
				(0.352)
ln (YP)	–0.852***	–0.824***	–0.817***	–0.731***
	(0.135)	(0.140)	(0.131)	(0.132)
Var (Y)	–0.00377	–0.0468	0.0345	–0.0189
	(0.102)	(0.115)	(0.0937)	(0.115)
Age	0.0267	0.0266	0.0636	0.0194
	(0.0358)	(0.0370)	(0.0419)	(0.0375)
Age^2	–0.000254	–0.000228	–0.000543	–0.000175
	(0.000329)	(0.000339)	(0.000372)	(0.000345)
Family_size	0.0834	0.0638	0.0367	0.0335
	(0.0603)	(0.0674)	(0.0619)	(0.0613)
Income_recip.	0.0534	0.0827	0.305*	0.307*
	(0.156)	(0.166)	(0.160)	(0.167)
Farmer	0.209	0.261	0.500	0.323
	(0.405)	(0.443)	(0.320)	(0.401)
Self_employed	0.00293	–0.0613	0.0726	0.115
	(0.172)	(0.201)	(0.175)	(0.184)
II wealth quartile	–0.0852	–0.140	0.123	0.0608
	(0.211)	(0.235)	(0.192)	(0.198)
III wealth quartile	–0.00746	–0.0643	–0.145	–0.162
	(0.260)	(0.281)	(0.300)	(0.338)
IV wealth quartile	–0.0723	–0.129	–0.231	–0.297
	(0.336)	(0.378)	(0.387)	(0.448)
Credit_card	–0.111	–0.0743	–0.111	–0.0465
	(0.180)	(0.188)	(0.181)	(0.174)
Real_variation	–0.152	0.970**	0.0183	0.115
	(0.509)	(0.472)	(0.717)	(0.374)
Financial_variation	0.481	0.0307	0.740	0.602*
	(0.350)	(0.237)	(0.570)	(0.351)
Home_owner	0.0950	0.119	0.137	0.209
	(0.179)	(0.197)	(0.170)	(0.183)
Parents	–0.657**	–0.614	–0.808***	–0.842**
	(0.322)	(0.445)	(0.295)	(0.344)
Constant	1.752*	1.620	–0.00523	0.193
	(0.971)	(1.013)	(1.225)	(1.157)
Instruments:				
Education, length of relationship with the bank				
Test of overidentifying restrictions (p-value):				
	0.5467	0.4343	0.9439	0.3900
Weak identification test (Kleibergen–Paap rk Wald F statistic)				
	11.4516	7.62495	7.36402	7.312
Observations	1266	1266	1266	1266

Notes: Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

TABLE 11

IV Estimation; Portfolio Diversification Using Alternative Instruments

Dependent variable: ln(precaut_y)				
	(1)	(2)	(3)	(4)
share_broad	2.368***			
	(0.759)			
share_narrow		3.529***		
		(1.254)		
dindex1			3.887***	
			(1.442)	
ndindex1				0.707***
				(0.236)
ln(YP)	–1.028***	–1.000***	–0.938***	–0.987***
	(0.0517)	(0.0624)	(0.0680)	(0.0595)
Var (Y)	0.0196	–0.00446	0.00588	–0.0617
	(0.0660)	(0.0684)	(0.0611)	(0.0719)
Age	0.0473	0.0423	0.0735**	0.0433
	(0.0341)	(0.0378)	(0.0346)	(0.0349)
Age^2	–0.000409	–0.000349	–0.000616**	–0.000332
	(0.000305)	(0.000342)	(0.000306)	(0.000312)
Family_size	0.122**	0.0912	0.0581	0.0585
	(0.0542)	(0.0612)	(0.0694)	(0.0660)
Income_recip.	–0.0372	–0.0694	0.156	0.153
	(0.126)	(0.144)	(0.128)	(0.129)
Farmer	0.633	0.595	1.349*	1.239*
	(0.539)	(0.549)	(0.765)	(0.674)
Self_employed	–0.101	–0.0756	–0.151	–0.149
	(0.185)	(0.198)	(0.190)	(0.199)
II wealth quartile	0.0824	0.0116	–0.0448	–0.0819
	(0.233)	(0.254)	(0.248)	(0.245)
III wealth quartile	0.0905	0.0912	–0.268	–0.347
	(0.259)	(0.270)	(0.347)	(0.347)
IV wealth quartile	0.190	0.128	–0.153	–0.289
	(0.296)	(0.328)	(0.401)	(0.413)
Home_owner	0.303	0.256	0.439**	0.478**
	(0.208)	(0.212)	(0.214)	(0.222)
Parents	0.192	0.118	0.00962	0.0318
	(0.287)	(0.315)	(0.299)	(0.343)
Constant	1.300	1.324	–0.418	–0.0606
	(0.927)	(1.006)	(1.028)	(0.961)
Instruments:				
Education, length of the relationship with the bank, risk aversion				
Test of overidentifying restrictions (p-value):				
	0.1714	0.2103	0.1122	0.1993
Weak identification test (Kleibergen–Paap rk Wald F statistic)				
	13.9893	7.26891	5.37777	5.84767
Observations	862	862	862	862
R^2	0.431	0.224	0.315	0.289

Notes: Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Each regression includes 21 regional dummies, and 4 city size dummies (not reported for brevity). Each regression is weighted using SHIW sampling weights.

However, significance of asset-ownership might be related to the fact that endogeneity is not adequately taken into account. Even using IV estimation, previous results are confirmed.

Once the importance of financial risk on households' precautionary saving is established, the role of portfolio diversification is taken into account. Although

financial instruments convey sector-specific shocks, provided that assets' returns are not perfectly correlated, an adequately diversified portfolio should help reduce the total riskiness of the portfolio. Consequently, a greater diversification of financial portfolios should give rise to a lower desired amount of precautionary saving. The empirical results show that portfolio diversification is not used by Italian households as a device to reduce total exposure to risk. This result is robust to the inclusion of different assets in the households' financial diversification index (i.e. all assets, risky assets in a broad and narrow definition), and to different computations of this index.

Further research would be needed to investigate more in-depth the assessment of the precautionary motive for saving using a hypothetical variable. In this regard, starting from February 2013, a cross-country database on household wealth will be available. This database will provide, for several countries, a variable indicating the purpose for saving, including precautionary saving. While there is no indication of how influential each stated reason is for each household, it represents an important piece of information, since it may help to disentangle precautionary motives from the rest. This would help to provide further evidence regarding the size and the magnitude of the precautionary motive for saving.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix: Variables Definition, Income Variance and First Stage Regression Estimates