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Three essays on households' financial decisions

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CHAPTER 1

PRECAUTIONARY SAVING UNDER LIQUIDITY CONSTRAINTS: EVIDENCE FROM ITALY*.

Abstract

In this paper, I empirically investigate precautionary savings under liquidity constraints in Italy using household panel data. Following Jappelli and Pistaferri (2000) I analyze a 3-year (1989-1993) rotating panel of the Bank of Italy Survey of Household Income and Wealth (SHIW). I exploit a unique indicator of subjective variance of income growth, which allows to measure the strength of the precautionary motive for saving, and a variety of survey-based indicators of liquidity constraints. However, my analysis deviates from Jappelli and Pistaferri's in three aspects. First of all, I attempt to differentiate between the standard precautionary motive for saving caused by uncertainty from the one due to liquidity constraints. I address this issue by using an endogenous switching regression approach, which allows me to cope with endogeneity issues associated with sample splitting techniques. Secondly, I try to capture changes in consumption behaviour of households who are not constrained at present, but expect binding constraints in the future. Finally, I cope with the downward bias in the estimation of the parameter associated to the subjective variance of income growth, using a direct measure of risk aversion. I eventually found the precautionary motive for savings to be stronger for those households who face binding constraints, or expect constraints to be binding in the future. Indeed, a complementarity relation exists between precautionary savings and liquidity constraints. Moreover, the introduction of a survey-based measure of risk aversion allows a better identification of the coefficient associated with the subjective measure of variance of income growth.

Key words: precautionary motive, liquidity constraints, switching regression.
JEL: E21, C2

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1. Introduction

According to the Life Cycle Permanent Income Hypothesis (LCPIH), consumers derive estimates of their ability to consume in the long run, and then set current consumption as an appropriate function of that estimate. Therefore, changes in consumption should be unrelated with anticipated changes in income and other variables in consumers' information set.
In the LCPIH framework, a closed form solution for consumption has been obtained under the Certainty Equivalence (CE) restrictive assumptions: perfect capital markets, equality between interest rate and the subjective discount factor and quadratic utility[1] (Flavin 1981; Campbell and Mankiw, 1991; Deaton 1992). Even if these assumptions make analytical models very easy to handle, they are quite unrealistic. Indeed, empirical evidence has shown that consumption follows income closely. Both liquidity constraints and myopia (Zeldes, 1989; Hall and Mishkin, 1982; Jappelli and Pistaferri, 2000) are among the causes of the excessive sensitivity of consumption to income. Moreover, risk is not neutral to consumption decisions, so that people save in a "precautionary" way to face unexpected drops in income (Dynan 1993; Guiso et al. 1992; Kennikell and Lusardi, 2005).
Once we take into account the pervasiveness of capital market imperfections and precautionary savings, we should deal with models which are able to incorporate these features. However, as Carroll and Kimball (2001) pointed out, when consumers face both liquidity constraints and uncertainty, analytical closed form solutions for consumption are not available. Many papers have attempted to explain households' decisions when both uncertainty and liquidity constraints are present, using simulation techniques. However, evidence is mixed. As Carroll and Kimball (2001) point out, one may consider two possible ways in which liquidity constraints and precautionary savings are related. On one hand, liquidity constraints may induce precautionary savings, and constrained agents have less flexibility in responding to shocks because the effects of the shocks cannot be spread out over time (Zeldes, 1984). Since uncertainty has a bigger negative effect on current consumption for constrained agents than for unconstrained ones, liquidity constraints and precautionary savings may be considered as complements. On the other hand, uncertainty may induce a consumption profile which is identical to that induced by the sole liquidity constraint. In this sense, liquidity constraints and precautionary savings are substitutes rather than complements.
As far as the empirical assessment of the precautionary savings-liquidity constraint linkage is concerned, very few papers have tried to take into account both these features. From this perspective, a joint analysis is needed in order to provide a complete overview of households' consumption and saving behaviour.
In this paper, I empirically estimate, on microeconomic data, a model which incorporates both precautionary savings and liquidity constraints. My aim is twofold. First of all, I empirically assess the strength of the precautionary motive for saving. Then I try to study to what extend the relevance of precautionary motive for saving due to uncertainty depends upon liquidity

[1] Except for the quadratic utility assumption, the Certainty Equivalence model relies on the same assumptions as the Perfect Certainty model developed in the late fifties by Modigliani-Brunberg and Friedman. Actually, as far as households' consumption behavior is concerned, these two models yield the same conclusions.

constraints. In particular, I investigate whether significant differences exist between constrained and unconstrained households as far as the relevance of the precautionary motive is concerned.
In the empirical estimation, following Jappelli and Pistaferri (2000) I analyze a 3-year (1989-1993) rotating panel of the Bank of Italy Survey of Household Income and Wealth (SHIW). The SHIW contains very detailed information about households' financial and real assets and a measure of nondurable consumption that is not affected by seasonality factors. Moreover, the SHIW contains a survey based indicator of liquidity constraints which allows us to distinguish between constrained and unconstrained households. Last but not least, using the SHIW we are able to exploit a unique measure of subjective expectations of income growth and a subjective measure of uncertainty. As Jappelli and Pistaferri (2000) point out, the subjective measure of income growth predicts income growth very well. The subjective variance of income growth is instead a very good measure of uncertainty, and it proves very useful in capturing the precautionary motive for saving. Although it cannot be interpreted in a structural way (i.e. the associated coefficient cannot be interpreted as the prudence coefficient), it allow us to take into account the role played by uncertainty in shaping consumption decisions, thus enabling us to measure the strength of the precautionary motive for saving.
Jappelli and Pistaferri (2000) test for excess sensitivity using the 1989-1993 panel component of SHIW. They do not find any evidence for excess sensitivity, but expose a strong and significant precautionary motive. I follow closely Jappelli and Pistaferri (2000), but I extend their approach in two directions.
First, I assess on empirical grounds the relation between precautionary motive for saving and liquidity constraints. Using the endogenous switching regression approach allows me to investigate the relative strength of the precautionary motive among constrained and unconstrained households, avoiding those endogeneity issues associated to sample split techniques. Therefore, I estimate an endogenous switching regression with known sample separation rule, using a survey-based direct indicator of borrowing constraint. I eventually found that the magnitude of the precautionary saving effect is bigger for constrained than for unconstrained agents. That means that a complementarity relation between precautionary savings and liquidity constraint exists. Actually, this is in line with Carroll and Kimball (2001), who analytically show that both uncertainty and liquidity constraints affect the convexity of the marginal utility function. From this perspective, introducing uncertainty and the liquidity constraint at the same time increases the concavity of the consumption function and therefore indicates greater prudence.
Moreover, I move one step further with respect to previous studies on consumption behaviour by taking explicitly into account *expected* liquidity constraints. These might potentially matter more than effective constraints. That is particularly true in Italy, where strong imperfections in the credit market make "discouraged" households less willing to apply for a loan in the credit market. From this perspective, households' consumption behaviour may be affected by the awareness of a low probability of obtaining a loan from the credit market, rather than effective liquidity constraints.
Actually, previous empirical studies based on Euler equation estimation do not capture the impact of future borrowing constraints on saving decisions. In order to explicitly take into account households' expectations of future liquidity constraints, I first estimate households' probability of being constrained as a function of current variables. Then, I use the estimated

coefficients to derive households' expectations, as of time t, of liquidity constraints at time $t+1$.
In order to measure expectations about future labour income and wealth, I exploit the information about the subjective expectation of future income and inflation. The estimated probability allows me to classify households as constrained (unconstrained) according to different cut-off values. Looking at the significance and the magnitude of the coefficient associated to the measure of uncertainty, I eventually found the precautionary motive for saving to be stronger for households who expect to be constrained. This result might be explained by taking into consideration the peculiarity of the Italian credit market. Because of the existence of strong imperfections, households do not rely on credit markets, preferring to save "precautionally", or relying on "informal networks" (i.e. help from parents or friends).
In order to check for the robustness of my results, I further estimate the probability of being constrained disentangling demand-side and supply-side factors. One issue with the credit constraint indicators is indeed the probability that the household is turned down. This is equal to the probability of applying for the loan multiplied by the probability of being turned down conditional on applying. The first reflects demand, whereas the second reflects supply of credit. In the analysis, I try to disentangle demand-side from supply-side related factors when considering expected constraints. Eventually, I found that previous results do not change when splitting the sample according to this probability.
Last but not least, I try to cope with the downward bias in the estimation of the parameter associated to the subjective variance of income growth, which may be plagued by a self selection problem. The subjective measure of variance reported by risk averse households will indeed be higher than the one reported by risk lovers. In this perspective, using patterns of variation across age, education, industry, occupation, might not be helpful. People who are more risk averse might choose to work in a relatively safe industry and to save more than those households who choose instead a relatively risky job. Consequently, it would be difficult to identify exogenous variations in uncertainty across households and the effect of an exogenous change in risk may be biased downwards.
Using a direct indicator of risk aversion instead of patterns of variations across various demographical indicators may help us to cope with these problems. The 1995 SHIW survey contains a question that allow us to develop the Arrow-Pratt measure of relative risk aversion[2]. Therefore, I estimate the Euler equation in the sub-sample of households who have been interviewed in periods 1989-1991-1993 and 1995. The results I found are in line with literature predictions. Introducing a direct measure of risk aversion in the estimated Euler equation allows a better identification of the coefficient associated to the subjective measure of income uncertainty.
The paper is organized as follows. In section 2 the main literature contributions about precautionary savings and liquidity constraint are reviewed. In section 3, the data are described and the Euler equation estimation is presented. In section 4 the switching regression framework is described, and estimation result are presented. Section 5 puts forward switching regression estimations, splitting the sample according to households' expected probability of being constrained. Section 6 concludes.

[2]See Guiso and Paiella (2003).

2 Literature review

From a theoretical point of view, the most widely used model to analyze consumption and saving decisions is the Life Cycle-Permanent Income model, developed by Modigliani and Friedman in the late fifties. In particular, the Certainty Equivalence (CEQ henceforth) version of this model has been largely employed in order to analyze households' wealth accumulation process (Modigliani and Brunberg, 1954; Friedman, 1957).
The popularity of the CEQ model is mainly due to its analytical tractability rather than to its ability to fit reality. Actually, CEQ specification assumes separable and additive preferences, and a quadratic utility function. This last feature is what makes the CEQ framework unable to capture the precautionary motive for savings. Actually, precautionary savings can be analyzed in a standard optimization framework, where households take decisions about how to allocate consumption between the present and the future**.** When risk is taken into consideration in the optimization problem, the prudence coefficient, given by the ratio between the third and the second derivative of the lifetime utility function, represents the relevance of the precautionary motive for savings (Kimball, 1990). Allowing a utility function specification with a non zero third derivative is therefore the key requirement to take into consideration the effect of uncertainty on future consumption and wealth allocation[3].
However, by taking into consideration a quadratic utility function, the CEQ specification does not leave any room for reaction to risk. In such a framework, the shape of the lifetime path of consumption is independent from the shape of the income path (Browning and Lusardi, 1996). Moreover, the marginal propensity to consume is independent of future risk. In this perspective, households set current consumption only by taking into consideration expected drops in income (i.e. "saving for a rainy day"). However, they do not shape their consumption decisions according to future sources of risk, behaving as if there was no uncertainty.
Consequently, serious estimation bias may arise if we estimate households' saving and consumption decisions without taking into consideration the role played by future risk. As Ludvigson and Paxon (1997) point out, ignoring the role played by consumption uncertainty can bias the coefficient of the intertemporal rate of substitution. Moreover, the conditional variance of consumption is correlated with the growth rate of income. Therefore, omitting the variance term may give rise to a serious bias, producing spurious evidence of excess sensitivity.
The role of precautionary savings has been widely investigated in the theoretical and empirical literature, using different methods. Some authors analyze the strength of the precautionary motive for saving estimating the Euler equation. In order to take into consideration the role played by uncertainty for consumption decisions, some authors, such as Dynan (1993), estimate a constant relative risk aversion utility function (CRRA) using consumption variability as a measure of future risk. Others (ex. Banks, Blundell and Brugiavini 1999) rely instead on Skinner (1988) approximation, and estimate the Euler equation using the variance of income innovations as a measure of the strength of precautionary savings.
Another strand of literature (Gourinchas and Parker, 2002; Cagetti, 2003) calibrates a life cycle optimization problem using empirical data on household-level income shocks, searching for the

[3]On this regard Besley (1995) shows that liquidity constraints may induce precautionary saving even when the utility function is quadratic.

values of parameters, such as risk aversion, that better fit empirical data. Finally, another strand of literature analyzes the strength of the precautionary motive for saving by regressing measures of savings, or wealth on various proxies for risk (Guiso et al., 1992; Carroll and Samwick, 1998; Lusardi, 1998)[4].
Actually, taking into account the effect of uncertainty in consumption choices is quite problematic. The main empirical problem is related to the necessity of finding suitable proxies for the conditional variance of consumption, which is not observable and endogenous. Dynan (1993) uses an IV estimation in order to cope with endogeneity, finding a very low estimate of the prudence coefficient. Survey-based subjective measures of uncertainty are used instead by another strand of literature (Jappelli and Pistaferri, 2000; Hayashi 1985). Moreover, as Carroll and Kimball (2006) and Dynan (1993) point out, a self selection problem may arise, making it difficult to identify exogenous variations in uncertainty across households. Using patterns of variation across age, education, industry, occupation, might not be helpful. Actually, a self selection problem may arise, since people who are more risk tolerant may both choose to work in a relatively risky industry and not save much. In this perspective, the effect of an exogenous change in risk may lead to a downward bias in the estimation of the coefficient associated to the measure of uncertainty.

In order to deal with uncertainty, we should allow the Euler equation to deviate from the certainty equivalent specification.
By definition, the Euler equation can be defined as the equality between the marginal rate of substitution of consumption in period t and $t+1$ and the relative price of consumption in these two periods. Formally:

$$(1) \quad u'(c_t) = \frac{1+r}{1+\delta} E_t u'(c_{t+1})$$

where $u(.)$ is the lifetime utility function, E_t is the expectation operator, r is the real-after tax rate of interest and δ is the rate of time preference.
By making a second order Taylor expansion, or, alternatively, assuming the joint distribution of consumption growth rate and interest rate to be lognormal and preferences are isoelastic, the (ex post) Euler equation becomes:

$$(2) \quad E_t \Delta \ln c_{t+1} = \gamma^{-1}(E_t r_{t+1} - \delta) + \frac{\gamma}{2} \mathrm{var}_t (\Delta \ln c_{t+1} - \gamma^{-1} r_{t+1}) + \varepsilon_{t+1}$$

where γ^{-1} is the intertemporal rate of substitution. The second term in the right hand side is the conditional variance of consumption growth rate, and it represents the strength of precautionary motive for saving. An increase in the variability of consumption growth rate has been found to be positively correlated with consumption growth rate.

[4]However, as pointed out by Carroll and Kimball (2006) the estimation of the coefficient associated to future risk using this approach is characterized by an high variability which cannot be imputed to differences across the various populations.

Alternatively, relying on CRRA utility, Skinner (1988) approximated the first order condition of the optimization problem and derive the following functional form for the rate of growth of consumption:

(3) $\Delta \ln c_{t+1} = \gamma^{-1} \ln (r_{t+1} - \delta) - \rho \Delta \varphi_{t+1} + m_{t+1} + \varepsilon_{t+1}$

where ρ is allowed to vary across different types of consumers, $\Delta \varphi_{t+1}$ represents change in household-specific characteristics, and m_{t+1} captures the impact of risk on households' consumption. Using this specification, Blundell and Stoker (1999) show that consumption growth depends on the conditional variance of income innovations scaled by the fraction of income to expected wealth. Banks et al. (2001) show instead that the risk term m_{t+1} depends on the variance of income shocks and on a scaling coefficient, given by the ratio between income and consumption at t.

As well as precautionary savings, liquidity constraints play a key role in shaping households consumption decisions. However, researchers have often found it difficult to identify liquidity constrained households. Earlier approaches implement excess sensitivity tests using asset-based sample split techniques (Zeldes, 1989; Runkle, 1991). However, as pointed out by Jappelli et al. (1998) this approach might lead to misclassification. More recent approaches use instead survey-based indicators of liquidity constraints, allowing those constraints to be endogenous. In this perspective, not only wealth and income but also socio-economic indicators are used in order to identify constrained households (Jappelli 1990; Garcia et al. 1998).
In order to test for the presence of liquidity constraints, the expected income growth is often added in the right hand side of the Euler equation. The Euler equation (2) then becomes:

(4) $E_t \Delta \ln c_{t+1} = \gamma^{-1}(E_t r_{t+1} - \delta) + \frac{\gamma}{2} \mathrm{var}_t (\Delta \ln c_{t+1} - \gamma^{-1} r_{t+1}) + \beta E_t \Delta \ln y_{t+1} + \varepsilon_{t+1}$

where $E_t \Delta \ln y_{t+1}$ is the expected rate of growth of income[5]. Given the endogeneity of $E_t \Delta \ln y_{t+1}$ and $\mathrm{var}_t (\Delta \ln c_{t+1})$, equation (4) should be estimated using IV approach. In equation (4) a significant β coefficient has been considered as a proof of the existence of liquidity constraints. Intuitively, households should react to expected income decreases only if they are prevented from borrowing. However, as Jappelli and Pistaferri (2000) point out, the excess sensitivity test is a weak test of liquidity constraints. Households might indeed not react to expected income declines because they save in advance. Moreover, the income growth term is not able to capture the effect of expected liquidity constraints, which might affect households' consumption behaviour as well as effective ones.

[5]Actually, in equation (4) $\Delta \ln y_{t+1}$ can be rewritten more generally as $\lambda_{i,t}$, which is the Lagrange multiplier associated with the liquidity constraint equation in the optimization problem. Actually, Zeldes (1989) and Jappelli et al. (1998) approximate $\lambda_{i,t}$ as a linear function of lagged income, $\lambda_{i,t} = \beta Y_{i,t}$, where β is equal to 0 for unconstrained households.

Giving room to uncertainty in the Euler equation allows us to explain two empirical facts. First of all, taking into account the precautionary motive for saving allows us to explain why the consumption growth rate is higher than what predicted by "certainty equivalence". Secondly, excluding the variance term may lead to a serious bias in the estimation of the coefficient associated to expected income growth in equation (3). Empirical literature has indeed shown that spurious evidence of excess sensitivity may arise if we do not include the uncertainty indicator in the estimation of the Euler equation.

3 Data and estimation.

In the empirical analysis, I use a 3-year (1989-1993) rotating panel of the Bank of Italy Survey of Household Income and Wealth. It is carried on every 2 years, and it contains very detailed information about households' financial and real assets, and a measure of nondurable consumption which is not affected by seasonality factors. As far as my empirical analysis is concerned, the SHIW contains a unique measure of subjective income and inflation expectations and a survey-based indicator of liquidity constraint. Defining an observation as 2 years of data, 1137 households have been interviewed between 1989 and 1991, 2420 households interviewed between 1991 and 1993 and 1050 households interviewed in 3 years. I only consider in the sample those households who have been interviewed for at least 2 consecutive periods. Moreover, I exclude from the sample those households where the household head has changed, those with inconsistent data on sex, age, or education, and households who do not respond to the question about subjective income expectations. The final sample includes 3629 households[6].
In order to measure the uncertainty faced by households, I use a measure of subjective expectation and variance of future income rate of growth. In 1989 and 1991 SHIW the following question was asked to household heads:

"We are interested in knowing your opinion about inflation/earnings twelve months from now. Suppose that you have 100 points to be distributed between the following intervals:
>25%, 20-25%, 15-20%, 13-15%, 10-13%, 8-10%, 7-8%, 6-7%, 5-6%, 3-5%, 0-3%
Are there any intervals which you definitely exclude? Assign zero points to these intervals. How many points do you assign to each of the remaining intervals?

This question allows us to derive the marginal distribution of the rate of growth of income and inflation, and to calculate first and higher order moments. As far as my analysis is concerned, the first and second moment are relevant. The first moment represents the expectation of the income growth rate. It is included in the estimation in order to look for the presence of excess sensitivity of consumption to expected income growth. The second moment instead represents the variance of the rate of growth of income. In a regression context, the coefficient associated to this term measures to what extend households react to perceived uncertainty in their income, modifying their consumption and saving choices. Therefore, looking at the sign and the magnitude of that coefficient helps us to analyze the relevance of the precautionary motive for savings by itself and in a context when we allow for effective or expected borrowing constraints. Since the question in

[6]Because of missing observations about inflation expectations, the sample reduces when we consider first and second moment of real income growth.

the survey refers to both income and inflation, we are able to calculate moments of nominal and real income. In this regard, by making specific assumptions about the correlation index between inflation and nominal income, Guiso et al. (1992) derive the expected value and the variance of the rate of growth of real earnings[7]. Jappelli and Pistaferri (2000) instead, use the expectation and the variance of nominal income rate of growth.

Actually, using subjective measures is not free from problems. First of all, as Jappelli and Pistaferri (2000) point out, the coefficient associated to the variance of the nominal income rate of growth has no structural interpretation. So, it cannot be interpreted as the prudence coefficient in a univocal way[8]. Moreover, such subjective measures might be plagued by measurement errors[9]. Furthermore, whereas consumption is measured at the end of each year (1989, 1991 and 1993), subjective expectations refer to the time at which interviews are taken (may 1990 and 1992). Finally, I consider income risk as the only source of uncertainty faced by households, without taking into consideration health and financial risk[10]. However, we can assume that income risk is the main source of uncertainty in a country like Italy where the National Health Service provides households broad coverage against illness. Moreover, the participation to financial market was very limited in the period we are considering (1989-1993)[11]. Therefore, we can consider the variance of the perceived rate of growth of income as a very good measure of household-specific uncertainty. Furthermore, using this measure makes it possible avoiding time series measures of risk, which reflect aggregate risk only, and cross sectional proxies for risk (such as sex and occupation) which are often correlated with other consumer attributes (Guiso et al, 1992).

In order to avoid the downward bias of the coefficient associated to the uncertainty, I employ the measure of risk aversion developed by Guiso and Paiella (2003). Using data from the 1995 wave of the SHIW, they use an information on household willingness to pay for a risky security to derive an Arrow-Pratt measure of risk aversion.

In 1995, the following question was asked to household heads.

We would like to ask you a hypothetical question that you should answer as if the situation were a real one. You are offered the opportunity of acquiring a security permitting you, with the same probability, either to gain 10 million lire or to lose all the capital invested. What is the most that you would be prepared to pay for this security?

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[7]See the appendix for the derivation of first and second moment of real income growth.

[8]As Jappelli and Pistaferri (2000) point out, only if utility is exponential and income is a random walk there is a one to one correspondence between income risk and consumption risk in the Euler equation. Otherwise, the relation between the two is nonlinear, and it depends on the specification of the utility function and on the income process.

[9]As Jappelli and Pistaferri (2000) point out, the significance of the coefficient associated to the variance cannot be due to measurement errors. Actually, in an OLS context measurement error in an independent variable tends to bias the coefficients towards zero. From this perspective, measurement error cannot explain, alone, a significant coefficient of income risk. For the same reason, measurement error in expected income may be the cause of the bias (towards zero) of the excess sensitivity coefficient.

[10] On this regard, Kennikell and Lusardi (2001) using a subjective measure of desired precautionary saving notice that other risks beyond income risk are responsible for households' level of precautionary saving.

[11]On this regard, see Guiso and Jappelli (2002).

This hypothetical security implies that with probability 0.5 the respondent gets 10 million lire and with probability 1/2 he loses the amount he pay for the security. The fact that this amount is greater, equal or less than 10 million implies risk loving, risk neutrality and risk aversion, respectively.
Following Guiso and Paiella (2003), the coefficient of absolute risk aversion, $R_i(w_i)$ is then calculated in the following way:

(5) $R_i(w_i) = -u''(w_i)/u'(w_i) = 4(5 - Z_i/2)/\left[10^2 + Z_i^2\right]$

where w_i is household i 's endowment, $u_i(.)$ is its lifetime utility and Z_i is the amount household i is willing to pay for the security.

Table 1 presents the average values of the nominal and real measure of conditional variance of income growth. Average values are calculated by different groups: age, classes, occupation, education, area of residence, risk aversion and wealth quartiles. Looking at the table, we notice that households' reported uncertainty is higher for young people and wage earners. As expected, uncertainty perceived by risk averse households is higher than the one perceived by risk lovers. Moreover, those households who belong to the first and second wealth quartile report a higher measure of income growth variance than the relatively rich households.

Instead of relying on a particular utility function, I estimate a more general equation. Using this approach does not allow to estimate structural parameters. That means that, for example, the coefficient associated to the variance of income growth cannot be interpreted as the prudence coefficient, as this would mean assuming a CRRA utility, and having the variance of consumption growth instead of the subjective measure. However, estimating a more general equation allows me to exploit the unique measures of subjective expectation and variance of future income rate of growth, which could not be used assuming a specific form for households' preferences.
Following Jappelli-Pistaferri (2000) the following equation is therefore estimated[12]:

(6) $\Delta \ln C_{i,t+1} = \alpha_1 age_{i,t+1} + \alpha_2 \Delta \ln FS_{i,t+1} + \eta(\text{var}\, redr)_{i,z,t} + \beta(eredr) + \theta_j \mu_{t+1} + v_{i,t+1}$

where $\Delta \ln C_{i,t+1}$ represents the rate of growth of nondurable consumption, $FS_{i,t+1}$ is the change

[12]Actually, Jappelli and Pistaferri (2000) estimate a slightly different equation. They estimate the equation using *eredn* as an instrument for the effective rate of growth of income. Moreover, they introduce in the estimation a dummy which indicates whether the spouse of the household head has started working between t and t+1, in order to control for labour supply which might lead to biased estimates of predicted income growth, leading to spurious evidence in favour of excess sensitivity. However, I do not introduce labour supply indicators in my estimation. My aim is indeed to focus on the coefficient associated to the variance of income growth, looking at the strength of precautionary motive for saving, instead of testing for excess sensitivity. Actually, even following Jappelli and Pistaferri the results of the IV estimation do not affect the significance of the coefficient associated to the measure of uncertainty.

in family size, $\text{var}\,redn$ is the subjective variance of nominal income growth and $eredn$ represents the subjective expectation of income growth.
Actually, using the first and second moment of the subjective measure of income growth does not imply estimating a proper Euler equation, and therefore structural parameters estimation. An alternative way to estimate the effect of income uncertainty on households choices would be relying on direct empirical measurement of the relationship between uncertainty and wealth. However, empirical estimates are characterized by huge variations, which cannot be totally imputed to differences in the data used in the estimation. Furthermore, negative past shocks may affect households wealth holdings, resulting in a null wealth held for precautionary reasons. From this perspective, households might not exhibit an higher wealth accumulation, even though they may reduce current consumption.
The forecast error is made of two terms. The first term, $\theta_j \mu_{t+1}$ represents an aggregate component. In particular, θ_j captures the effect of unevenly distributed aggregate shocks μ_{t+1} on the forecast error in consumption. The second term $v_{i,t+1}$ is a household-specific idiosyncratic component. The reason why the forecast error in consumption has such a specification is mainly to avoid excess sensitivity that may arise from the misspecification of the stochastic structure of the forecast error[13]. In order to cope with this problem, time dummies and interaction between time dummies are included in the Euler equation.

Table 2 shows the estimation results of equation (6). Specification (1) excludes risk aversion. The coefficient associated to the conditional variance of the nominal income rate of growth is significant at 1% level. A positive and significant coefficient of the variance provides therefore evidence in favour of the precautionary saving hypothesis, as economic agents postpone consumption to the future by reducing current consumption.
In specification (2)-(4), in order to correct for the downward bias of the coefficient associated to the variance of the income rate of growth, I select the subsample of households interviewed in the periods 1989- 1991 and 1995 . Particularly, specification (2) includes the interaction term between household net wealth and absolute risk aversion. In specification (3) I only include households who report being risk averse[14], but I do not incorporate the measure of risk aversion, which is included instead in specification (4). Results show that including risk aversion leads to a better (and higher in magnitude) estimation of the coefficient associated to the precautionary motive. Intuitively, risk aversion is a key determinant of the precautionary motive for saving, since only risk averse households would be induced to save in order to face unexpected contingencies. Furthermore, the significance of the risk aversion coefficient implies that risk attitudes are an important determinant of households' consumption choices. From this perspective, accounting for attitudes towards risk in a regression solves an omitted variable problem. In line with Carroll and Kimball (2006) , the coefficient associated to the conditional

[13]If $T \to \infty$, the forecast error goes to 0. However, in panels with small T and big N there is no guarantee that the forecast error goes to 0 as $N \to \infty$.
[14]Risk averse households are those who report they would pay less than 10 million lire to buy the hypothetical security. Actually, they are the majority (1640 observations, 95.32% out of total sample).

variance of nominal income rate of growth is higher and better estimated.

4 Switching regression estimation.

So far, I have provided an empirical assessment of the relevance of households' precautionary motive for saving, suggesting a procedure to correct for the downward bias in the coefficient associated to the subjective variance of income growth. The next step would be to assess whether liquidity constraints significantly affect households reaction to labour income uncertainty.
From now on, cross sectional estimation will be performed, without exploiting the panel dimension of the data. Actually, because of a relatively low number of observations in the subsample of constrained households, a panel estimation is not feasible. Moreover, pooled estimation is also preferred because there is not enough variability in the probability of being constrained. Therefore, I carry out a cross sectional estimation, selecting only those households who were interviewed for 2 years, in order to avoid problems related to intra-household correlation. Moreover, instead of using the nominal measures of expected value and variance of income growth, I use real ones. This helps to avoid having the magnitude of coefficient associated to dependent variables in the regression determined by movement in nominal variables.
Table 3.1 presents results of the cross sectional estimation. In specification (2), the interaction term between household's coefficient of risk aversion and net wealth is included. We can notice that not only the coefficient associated to *varredr* is higher , but the risk aversion term is significant (at 10% level). Specification (3) includes the change in household income, whereas in specification (4) the latter variable is instrumented with the first moment of subjective income growth. Actually, *varredr* is always significant at 1% level.

The first step to investigate whether reaction to labour income uncertainty differs among constrained and unconstrained households is to perform a sample split. Earlier studies aiming to detect the relevance of liquidity constraints indeed rely on sample split techniques (Hayashi, 1985; Zeldes, 1989; Shea, 1995).
Table 3.2 presents sample split results, using several indicators of liquidity constraints[15]. In specification (1) *lb1* is used as a criteria to split the sample. *lb1* takes value 1 if the household request for a loan has been rejected, or if the household did not ask for a loan fearing rejection ("discouraged" households). This is the survey-based measure of liquidity constraints provided by the SHIW. According to that, less than 4% of all population is considered constrained. An objection to this indicator of liquidity constraints regard the fact that the question about being turned down for a loan may pertain mainly to households who want to purchase a durable good (such as a house or a car), whereas the Euler equation refers to nondurable consumption. However, as pointed out by Jappelli et al. (1998), banks use to look at households' ownership of such goods in order to decide whether rejecting or not the loan. Consequently, using such an indicator would give a good idea of who is going to be constrained. The coefficient associated to

[15]See the appendix as far as frequency of households which can be considered as constrained/unconstrained according to several classification criteria.

varredr is higher for constrained rather than unconstrained households. This result also holds when the (effective) change in income is included in the estimation, and when the latter is instrumented with *eredr* (specification 2 and 3, respectively)
In specification (4) and (5), alternative definitions of liquidity constraints are used. This allows me to check for the robustness of my results and to increase the number of observations in each subsample. According to the second definition (*lb2*), households are constrained if their wealth is lower than 2 months' income (Hayashi, 1984). The third definition (*lb3*) uses the level of indebtness (at time t) of the household in order to distinguish between constrained and unconstrained households. According to the third definition, a household is constrained if it has a ratio of financial liabilities/(real+financial asset) higher than 0.5.
Even using alternative definitions of liquidity constraints, the coefficient associated to the uncertainty indicator is still significant and higher for constrained rather than unconstrained households (table 4.2). In this perspective, adding a liquidity constraint (at time t) strengthen households' reaction to uncertainty. However, if a significant correlation exists between the selection equation's and the Euler equation's error term, sample split may lead to spurious estimation. Actually, the existence of such a correlation should be proved.

In order to correctly estimate the strength of the precautionary motive for saving across constrained and unconstrained agents, I will therefore rely on a switching regression approach. This approach has been used, among others, by Jappelli et al. (2001) and Garcia et al (1997). They look for the presence of liquidity constraints, looking at the significance and the magnitude of the coefficient associated with lagged income among constrained and unconstrained households.
Here, I extend previous investigations on consumption behaviour by investigating the strength of precautionary savings among constrained and unconstrained agents. Therefore, I will focus on the magnitude and significance of the coefficient associated to the subjective variance of income growth, which is a measure of the precautionary motive for savings, among two different regimes. In this respect, my analysis is similar to Lee and Sawada (2009) who investigate the relationship between precautionary savings and liquidity constraints using survey data from Pakistan. However, my analysis differs from Lee and Sawada (2009) in three aspects. First of all, I use the unique piece of information regarding subjective expectations of income growth provided by the SHIW. Moreover, unlikely Lee and Sawada (2009) I take into consideration expected rather than effective liquidity constraints. As Carroll and Kimball (2001) and Jappelli and Pistaferri (2001) point out, excess sensitivity tests are not able to capture the effect of expected liquidity constraints. From this perspective, the coefficient associated to expected income growth may be not significantly different from zero - thus not rejecting the orthogonality condition provided by the LCPIH- if households expect to be constrained in the future. I will therefore extend Lee-Sawada analysis by estimating households' expectations of future liquidity constraints with a two-step procedure.

As far as the empirical estimation is concerned, I will rely on a switching regression framework in order to differentiate consumption behaviour among constrained and unconstrained agents. First of all, I estimate the Euler equation using an endogenous switching regression model with known sample separation rule using the survey-based indicator of liquidity constraints provided by the data. Then, I split the sample according to different cut-off values of households' estimated probability of being constrained.

In what follows, I present the general switching regression framework used to estimate the model with effective constraints as well as the model with expected ones.
The equation to be estimated on the whole sample can be rewritten as:

(7) $\Delta \ln C_{i,t+1} = \alpha_1 D_{i,t+1} + \alpha_2 (\text{var } redr)_{i,z,t} + \alpha_3 (eredr)_{i,t} + \theta_j \mu_{t+1} + v_{i,t+1}$

where $eredr$ and $varredr$ are respectively, the expected value and the variance of real income growth at time t, $D_{i,t+1}$ includes demographic controls, such as age, sex, occupation, change in family size and in the number of income recipients, and θ_j captures the effect of unevenly distributed shocks. In the general specification of CRRA utility function with uncertainty and borrowing constraint, the lagged value of disposable income is included in order to take into account the shadow value of liquidity constraint. Here, following Jappelli and Pistaferri (2000) I include instead the expected value of income growth, in order to test for excess sensitivity of consumption to expected income changes. This way, I can look at the significance of the precautionary motive for saving, checking at the same time whether excess sensitivity is found among constrained agents. This is particularly relevant for my analysis: excess sensitivity tests are not indeed particularly powerful to test the presence of liquidity constraints. One of the reason is that excess sensitivity may be due to other reasons, different to borrowing constraints (myopia for example). Moreover, the Euler equation does not allow us to take into consideration future or expected liquidity constraints. However, the mere analysis of current constraints might be restrictive, especially in a country like Italy, where credit market imperfections discourage household to ask for a loan in the credit market. In my analysis I will therefore check whether excess sensitivity to expected income growth is found in the constrained subsample, looking at the same time at the significance of the second moment of income growth.
Considering 2 different groups of households (constrained and unconstrained), the previous equation can be written as a switching regression model with known sample separation rule, in the following way (see Maddala, 1986):

(8) $\Delta \ln C^{C}_{i,t+1} = \alpha^{C}_1 D_{i,t+1} + \alpha^{C}_2 (\text{var } redr)_{i,z,t} + \alpha^{C}_3 (eredr)_{i,t} + \theta^{C}_j \mu_{t+1} + v^{C}_{i,t+1}$ (constrained regime)

(9) $\Delta \ln C^{U}_{i,t+1} = \alpha^{U}_1 D_{i,t+1} + \alpha^{U}_2 (\text{var } redr)_{i,z,t} + \alpha^{U}_3 (eredr)_{i,t} + \theta^{U}_j \mu_{t+1} + v^{U}_{i,t+1}$
(unconstrained regime)

(10) $X_{i,t} = \gamma Z_{i,t} + u_{i,t}$ (selection equation)

where:

(11) $\Delta \ln C_{i,t+1} = \Delta \ln C^{C}_{i,t+1}$ if $I = 1$

(12) $\Delta \ln C_{i,t+1} = \Delta \ln C^{U}_{i,t+1}$ if $I = 0$

where I is a dummy variable which classifies households among constrained and unconstrained.
Specifically:

(13) $I = 1$ if $X_{i,t} > 0$

(14) $I = 0$ if $X_{i,t} <= 0$

As Lee and Sawada (2009) point out, $X_{i,t}$ can be rewritten as:

(15) $X_{i,t} = C^*_{i,t} - C_{i,t}$

where $C^*_{i,t}$ is the optimal level of consumption in absence of constraints, and $C_{i,t}$ the effective consumption when constraints are present. Jappelli (1990) and Hayashi (1985) approximate this difference as a quadratic function of observable cross sectional variables, such as current income, wealth and demographics. Assuming that the credit ceiling is a function of the same variables, we can write $X_{i,t} = \gamma Z_{i,t} + u_{i,t}$, that is the selection equation.

In the selection equation, $Z_{i,t}$ includes indeed several variables predicting liquidity constraints. Earlier approaches, only included in *Z* financial variables. Zeldes (1989), for example, use a simple asset/income ratio in order to determine who is liquidity constrained. However, as Jappelli et al. (2001) point out, this approach might lead to misclassifications. Following Jappelli (1990) and Garcia et al. (1997) I assume endogenous liquidity constraints. That means allowing credit availability to depend not only on economic variables, but also on socioeconomic indicators.

The model described above is an endogenous switching regression model with known sample separation rule. Assuming endogenous switching means allowing a significant correlation between the error term of the main equation and in the selection equation, that is:

(16) $\sigma_{vu} \neq 0$

The simplest case where the previous assumption is satisfied is when the regressors of equation (8) and (9) are included in the selection equation (10). However, this is only one of the cases of endogenous switching[16]. Actually, the existence of a significant correlation between the error term of the main equation and the error term of the selection equation needs to be proved empirically. Some authors as. Garcia et al. (1997) argue that assuming endogenous liquidity constraints is not plausible, since households do not choose to be constrained. From this perspective, households request for a loan can be viewed more as the outcome of credit market-

[16]From this perspective, the inclusion of subjective moments of income growth as explanatory variables of the probability of being constrained can be explained by taking into consideration the fact that the measure of constraints we are using encompasses both demand and supply-side factors. From this perspective, subjective average and variability of future income growth - albeit not affecting the probability the loan is rejected- are likely to affect household probability of asking for a loan. This is true, in particular, when expected constraints are taken into account.

related factors rather than household decisions. However, as pointed out by Lee and Sawada (2009), the household can choose to be unconstrained, (i.e. having a desired level of consumption lower than the effective one). Having defined the liquidity constraint indicator as dependent on the gap between desired and effective level of consumption, assuming exogeneity of liquidity constraint is not so straightforward.
I estimate the model through a full information maximum likelihood (FIML) estimation[17]. This allows to simultaneously estimate the binary and continuous part of the model, and to avoid inconsistent estimates of standard errors[18]. Actually, if $\sigma_{vu} \neq 0$, estimating separately equation (8) and (9) would lead to spurious results.
Obviously, the correlation between the error term in the main and in the selection equation needs to be proved. If the correlation term is found not to be statistically different from 0, the equations describing each regime and the sorting equation are independent, so that an exogenous instead of endogenous switching model should be estimated.
Actually, if the correlation term between the error term in the main and in the selection equation turns out to be zero, the model reduces to OLS.

The switching regression model above can be rewritten in one equation as:

(17) $\Delta \ln C_{i,t+1} = \theta_2 W_{i,t+1} + (\theta_1 - \theta_2) W_{i,t+1} I_{i,t} + \varepsilon_{\mathrm{i,t+1}}$

where:

(18) $\theta_1 W_{i,t+1} = \alpha_1^U D_{i,t+1} + \alpha_2^U (\ \mathrm{var}\, redr)_{i,z,t} + \alpha_3^U (eredr)_{i,t} + \theta_j^U \mu_{t+1} + v_{\mathrm{i,t+1}}^{\mathrm{U}}$
and

(19) $\theta_2 W_{i,t+1} = \alpha_1^C D_{i,t+1} + \alpha_2^C (\ \mathrm{var}\, redr)_{i,z,t} + \alpha_3^C (eredr)_{i,t} + \theta_j^C \mu_{t+1} + v_{i,t+1}^C$

I is the indicator of borrowing constraints. So if $\mathrm{I} = 1$:

(20) $\Delta \ln C_{i,t+1} = \theta_1 W_{i,t+1} + \varepsilon_{i,t+1}$

whereas if $\mathrm{I} = 0$:

(21) $\Delta \ln C_{i,t+1} = \theta_2 W_{i,t+1} + \varepsilon_{i,t+1}$

Tables 3.3 (a) and (b) presents the results of the estimation of the endogenous switching

[17]Actually, this method gives more efficient estimates rather than heckman two-step approach.
[18]Lee and Sawada estimate instead a V type tobit using treatment effect model instead, which is a particular case of the switching regression approach. Particularly, treatment effect models does not allow the effect of the treatment to vary across regimes.

regression model. In the selection equation the probability of being constrained depends on age, education, wealth, wealth squared and geographical area. Moreover, in order to improve upon the identification of the selection equation I add as a regressor the interaction term between the percentage of bank counters in each region and the average number of inhabitant in the city where the household lives[19]. Intuitively, this variable should be strongly correlated with the probability of being liquidity constrained but not correlated with changes in consumption growth. Actually, we should observe, ceteris paribus, that the higher the number of bank branches in a certain town, the higher the opportunity to ask for a loan in the credit market and, therefore, the probability of being constrained.

In specification (I) I use a survey based indicator of borrowing constraints (*lb1*). More specifically, the dummy variable *lb1* takes value 1 if the household at time *t* has asked for credit and the loan has been rejected or if the household did not ask for credit fearing its request may be rejected ("discouraged borrowers").

In specification (1), the coefficient associated to the variance of real income growth for constrained households is positive and significant at 5% level, whereas it is lower for unconstrained ones. These results are in line with Carroll (2001). Actually, a complementarity relation exists between precautionary savings and liquidity constraints, so that the introduction of a liquidity constraint increases the precautionary motive. *Rho0* and *Rho1* represent the correlation term between the error term of the selection equation (10) and error terms of equations (8) and (9), respectively.

Rho1 is highly significant in all the specifications, for both constrained and unconstrained households. That suggests that the correlation between the error term in the main equation and in the selection equation is nonzero, and the use of an endogenous switching is justified. Moreover, *Rho0* and *Rho1* have the "right" sign in both subsamples. For constrained households, *Rho1* is positive. It means that a constrained household has higher consumption growth than a random household. In the subsample of unconstrained households instead, *Rho0* is negative, meaning that unconstrained households have lower consumption growth than a random household.

Actually, no excess sensitivity is found either for constrained or for unconstrained households. The same result has been found by Jappelli and Pistaferri (2000) in the entire sample and dividing the subsample according to the wealth/income ratio. Actually, this result does not invalidate my analysis and it can be explained taking into account the peculiarity of Italian credit markets. Due to high downpayment requirements and high transaction costs, Italian household do not trust credit markets. As Guiso and Jappelli (1994) point out, Italian households who do not obtain a loan in the credit market might ask for help to parents or friends in order to overcome credit market deficiencies. As a consequence, even if they are constrained in the credit market, households do not show excess sensitivity to expected income growth, since they can ask "informal" networks (relatives, friends, etc.) for funds.

Moreover, the same lack of confidence in credit market may lead Italian household to save more over time, in order to have some kind of protection against future income shocks. In this perspective, a classical test of excess sensitivity has a relatively weak power, since households

[19]Data comes from the Bank of Italy "Base Informativa Pubblica".

may save more over time in order to protect against their restricted access to liquidity.
Finding an high precautionary motive but no evidence for excess sensitivity gives therefore further strength to the complementarity relation between precautionary savings and liquidity constraints. Households do not show excess sensitivity because they strongly save "precautionally' in order to face future risk, including the impossibility to get additional funds from a bank or a financial institution.

In order to check robustness of the results, in specifications (2) and (3) the switching regression is implemented using alternative indicators of liquidity constraints. In specification (2) the survey based indicator of liquidity constraint *lb1* is combined with *lb2* , whereas in specification (2) *lb2* is combined with *lb3*. In this sense, a household is defined as presumably constrained if at least one of the dummies (*lb1* or *lb2,* in specification (2) or *lb2* and *lb3* in specification (3)*)* is equal to one. On the contrary, the household is defined as presumably unconstrained if all these dummies are jointly equal to zero.
Actually, even when alternative definitions of constraints are considered, the coefficient associated to *varredr* is higher for constrained rather than unconstrained households. However, *Rho1* and *Rho0* are no longer significant. This is in line with the strand of literature which criticize the use of asset-based indicators in order to identify who is constrained in the credit market. From this perspective, a direct survey-based indicator of borrowing constraints provides a more precise criteria to identify those obstacles in credit markets which affect households saving and consumption decisions.

5. Switching regression estimation with perceived probability of being constrained.

As Carroll and Kimball (2001) point out, expected liquidity constraints might affect households' consumption choices as well as effective ones. In particular, they argue that precautionary saving may arise from the possibility that constraints may bind in the future, even if a household is not effectively constrained at the time of consumption and saving choices. They formally show indeed that once the concavity of consumption function is induced, by liquidity constraints or by uncertainty, it propagates backwards. In this perspective, households who expect liquidity constraints to bind in the future may save more, in order to make the constraint less likely to bind.
Here, I try to capture the effect of households' expectations about future constraints on their consumption and saving choices. In order to estimate households' expected probability of liquidity constraints, I rely on a two-step procedure. I first estimate household probability of being constrained at time t, as a function of demographics, current wealth and current income.

Formally:

$$(22)\ \Pr ob(liq.constra\text{int})_t = \beta(X_t) + \varepsilon_t$$

where X_t includes demographics and financial variables at time t, and ε_t is the error term. The estimated coefficients are then used in order to estimate households' expected probability of

being constrained in the future:

$$(23)\quad E_t[\,\Pr ob(liq.constra\,\text{int}\,)_{t+1}] = \hat{\beta}\,E_t(X_{t+1}) + \varepsilon_{t+1}$$

where X_{t+1} includes future variables known at time t. In particular, the expectation at time t of income at $t+1$ is calculated multiplying current labour income for the subjective expectation of income growth. In the same way, future (expected) wealth is obtained from current net wealth, using subjective expectations about future inflation. In this perspective, income and inflation subjective expectations provide a useful tool, letting us be able to know to what extend expectations about future variables affect households' perception about future constraints.
Estimated probabilities are then used to distinguish among constrained and unconstrained households. In particular, an household is classified as constrained if the estimated probability is higher than a certain cut-off value[20].

Table 4.1 presents results of a sample split using different cut-off values of the probability estimated in the previous section. In particular, in specification (1) an household is defined as constrained when the expected probability of future liquidity constraints is higher than 10%; in specification (2) instead, the cut-off value is 20%[21]. Even in this case, the coefficient associated to the variance of subjective income growth is higher for constrained rather than unconstrained households[22].

One issue with the credit constraint indicator is indeed that this is the probability that the household is turned down. This is equal to the probability of applying for the loan times the probability of being turned down conditional on applying. The first reflects demand, whereas the second reflects supply for credit.
Previously I have defined a household as liquidity constrained if the desired level of consumption is higher than the effective one. In this perspective, a household can be considered not constrained in two cases. First of all, if it is able to obtain all the needed resources. Secondly, it might be that the household is a saver; in this case it would use the resources the household piled up in the past rather than asking for a loan. Whereas the first case is related to supply-side factors-i.e. a well developed loan market- the second one reflects households' specific attitudes towards saving and consumption. As far as our analysis is concerned, the first case is more relevant than the second one, since we are arguing that households' reaction to labour income uncertainty is strongly affected by credit market imperfections (therefore, credit supply related factors).

[20]Note that the dependent variable in the probit regression is a dummy which takes value 1 if liquidity constraint indicators *lb2* or *lb3* take value 1, 0 otherwise. We tried alternative specifications using *lb2* or *lb3* alone, or *lb1*. Actually, results remain basically unaffected.
[21]As shown in the appendix, the average value of the estimated probability is around 13%.
[22]A switching regression has also been performed. Actually, empirical results are basically the same, albeit correlation coefficient *rho1* and *rho2* are not significant. Results are not reported but they are available upon request.

As a further robustness check, I disentangle demand and supply effects. In other words, I estimate the conditional probability of being constrained conditional of asking for credit. Actually, it is possible to identify separately households who ask for a loan and those who do not , but only in 1989 wave of the SHIW. Estimated conditional probability is imputed to all households in the sample using the two-step procedure described above.
Using the former probability gives higher percentages of constrained households. Whereas using previous indicators of *effective* liquidity constraints yields almost 4% of households as constrained ones, using the estimated probability of expected constraints - and disentangling between demand and supply side determinants of constraints brings this percentage to almost 60%. So, even if a low percentage of household is constrained- it may be that those not constrained are savers, a very high percentage of those who intend ask for a loan expect to be constrained. Actually, this is consistent with Italian credit market imperfections.
In table 4.2, a sample split and a switching regression are performed, using 0.6 as cut-off value in order to disentangle constrained and unconstrained households[23]. As table 4.2 shows, the coefficient associated to *varredr* is higher for constrained rather than unconstrained households. Moreover, *rho1* and *rho2* are significantly different from zero, thus strengthening the hypothesis of endogeneity of liquidity constraints.

6. Conclusions

In this paper, I have analyzed consumption behaviour in Italy using household panel data from the SHIW. In particular, I have tried to differentiate between the standard precautionary saving due to unforeseen contingencies and the one due to liquidity constraints. To do that, I have used a subjective measure of real income variability together with a survey based indicator of liquidity constraints, provided by the SHIW.
I first estimated a pseudo Euler equation, finding strong support for the precautionary motive for savings. Then, I augmented the estimated equation with a unique indicator of Arrow-Pratt relative risk aversion, in order to cope with the downward bias in the estimation of the coefficient associated to the variance of real income growth. As expected, the estimated coefficient is higher in both magnitude and significance.
Then, I have estimated an endogenous switching regression, in order to differentiate the precautionary saving due to income risk from the one due to liquidity constraints. Using an endogenous switching regression framework allows to differentiate between constrained and unconstrained agents, avoiding the selection bias associated to sample split techniques. Precautionary savings and liquidity constraints are found to be complementary. From this perspective, households who face simultaneously both uncertainty and liquidity constraints have a stronger precautionary motive than unconstrained ones. This results can be explained by taking into consideration the impossibility, for constrained households, to borrow money in order to face future unexpected contingencies. Moreover, no evidence of excess sensitivity of

[23]Actually, 0.6 is the closest value to the average of the estimated probability. Moreover, this is the value which gives the highest value of max-likelihood. This is actually in line with models of endogenous switching with unknown sample selection rule (see Hotchiss, 1991).

consumption growth to expected income growth has been found for constrained households, nor for unconstrained ones . A stronger attitude towards saving and the non-negligible role played in Italy by "informal networks" (i.e. help from parents or friends) are indeed good candidates to explain the absence of excess sensitivity.

In the last part of the paper, I exploit the measure of subjective income expectations in order to estimate households' expected liquidity constraints. As Carroll (2001) and Jappelli and Pistaferri (2000) point out, households might strongly react to uncertainty because they expect to be liquidity constrained in the future, even if they are not effectively constrained. Actually, households whose aim is to smooth their consumption patterns over time should save more in the present because they know they will be not able to obtain additional resources in the future. I estimated the switching regression according to different cut-off values of households' perceived probability of future constraints. Switching regression estimates show those households with a relatively high probability of being constrained to have a stronger precautionary motive compared to those who do not expect to be constrained in the future. These results are robust to alternative specification of the switching regression model.

Because of their limited trust in credit markets, Italian households tend to save more in order to face unexpected contingencies. The high and significant precautionary motive might indeed explain the lack of excess sensitivity to expected income growth. This result might also be explained by taking into consideration the strong role played by "informal networks" in Italy (i.e help from parents or friends), which might indeed help releasing binding borrowing constraints.

Appendix

List of variables used in the empirical analysis:

DC log rate of growth of nondurable consumption

DY log rate of growth of income

Varredn variance of nominal income rate of growth

Eredn expected rate of growth of nominal income

Varredr variance of real income rate of growth

Eredr expected rate of growth of real income

Male dummy=1 if the household head is male, 0 otherwise

Age age of the household head

Dncomp change in family size

Farmer dummy=1 if the household head is a farmer

Entrepreneur dummy=1 if the household head is an entrepreneur

W household net wealth (financial asset + real asset –financial liabilities)

W2 squared household net wealth

Wrisk coefficient of risk aversion (as in Guiso and Paiella, 2004)*W

acom2 dummy=1 if number of inhabitants is between 20,000 and 40,000

acom3 dummy=1 if number of inhabitants is between 40,000 and 500,000

acom4 dummy=1 if number of inhabitants is > 500,000

South dummy=1 if the household head lives in the south

Bank counters number of bank counters per person (regional basis)

Sample selection

The panel component of the SHIW includes 3629 observations. I only considered household heads. I dropped all the observations that do not appear for at least 2 years. Moreover, I dropped all the observations with inconsistent data, and those lacking data on subjective expectations.

Variables definition
Inflation Uncertainty

On this table we have indicated some classes of inflation. We are interested in knowing your opinion about inflation twelve months from now. Suppose now that you have 100 points to be distributed between these intervals. Are there intervals which you definitely exclude? Assign zero points to this intervals. How many points do you assign to each of the remaining intervals? For this and the following variable the intervals of the table shown to the person interviewed are the same. The intervals are: >25; 20-25; 15-20; 13-15; 10-13; 8-10; 7-8; 6-7; 5-6; 3-5; 0-3; <0 percent. In case it is less than zero, the person is asked: How much less than zero? How many points would you assign to this class?

Earnings uncertainty

We are interested in knowing your opinion about labour earnings or pensions twelve months from now. Suppose now that you have 100 points to be distributed between these intervals. Are there intervals which you definitely exclude? Assign zero points to this intervals. How many points do you assign to each of the remaining intervals?

Derivation of subjective moments of real income growth

Following Guiso-Jappelli-Terlizzese (1992), define z as the percentage growth rate of nominal earnings, π as the rate of inflation, and x as the rate of growth of real earnings, where:
$z = x + \pi$, and

$$\sigma_z^2 = \sigma_x^2 + \sigma_\pi^2 + 2\rho\sigma_x\sigma_\pi$$

σ_x can therefore be rewritten as:
$$\sigma_x = -\rho \pm \sqrt{\sigma_z^2 - (1-\rho^2)\sigma_\pi^2}$$

Since the variance of nominal income can be either positive or zero, there are 4 possible cases:

if $\sigma_z^2 = 0$ and $\sigma_\pi^2 = 0$, then $\sigma_x^2 = 0$
if $\sigma_z^2 > 0$ and $\sigma_\pi^2 = 0$, then $\sigma_x^2 = \sigma_z^2$

if $\sigma_z^2 = 0$ and $\sigma_\pi^2 > 0$, then $\sigma_x^2 = \sigma_\pi^2$
if $\sigma_z^2 > 0$ and $\sigma_\pi^2 > 0$, then $\sigma_x^2 = (\sigma_z + \sigma_\pi)^2$

Liquidity constraints
1989

1) In 1989 did your household apply to a bank or a financial company for a loan or a mortgage?
Yes
No

2) Was the application granted in full, in part or rejected?
Granted in full
Granted in part
Rejected

3) Why didn't you apply for a loan in 1989?
no need for a loan
I thought the application would be rejected

1991
1) In 1991 has your application for a loan been rejected or granted in part?
Yes
no

In 1991 did you or another member of your household consider the possibility of applying to a bank or a financial company for a loan or a mortgage but then change his/her mind thinking that

the application would be rejected?

Frequency of constrained households using different definitions of liquidity constraints.

Table (a)

Effective constraints

	constrained	**unconstrained**
b1	3.66%	96.34%
b2	7.33%	92.67%
b3	3.87%	96.13%
b1+b2	10.60%	89.40%
b1+b3	7.22%	92.78%
b1+b2+b3	11.36%	88.64%

Table (b)

Expected constraints

pprob	**constrained**	**unconstrained**
e_prob	13.89%	86.11%
cond_prob	58.98%	41.02%

Table (a) reports descriptive statistics regarding different definitions of liquidity constraints. According to the first definition (*b1*) households are constrained if they ask for a loan but their request is rejected, or if they are "discouraged" (they do not ask for a loan because they think they will be rejected). In order to increase the number of observations in the subsamples, I consider other indicators of liquidity constraints. According to the second definition (*b2*), households are constrained if their total net wealth is lower than 2 months' income (Hayashi, 1984). The third definition (*b3*) uses households' past level of indebtness in order to distinguish between constrained and unconstrained households. According to the latter definition, an household is considered as constrained if the ratio financial liabilities/(real+financial asset) is greater than 0.5.

Table (b) reports descriptive statistics regarding estimated probability of future (expected) liquidity constraints. *e_prob* is obtained in two step. First, the probability of liquidity constraint at time *t* is estimated, using a joint indicator (*lb2* and *lb3*) as dependent variable. Then, coefficients obtained in the first step are used to estimate households' expected probability of being liquidity constrained in the future. In order to get credible values of explanatory values at time *t+1*. An household is defined as constrained if *e_prob* is higher than 0.6, unconstrained otherwise.

cond_prob is obtained with the same two-step procedure used to obtain *.e_prob.* However, the probability estimated in the first step is obtained by a conditional probit. A household is defined as constrained if *cond_prob* is higher than 0.6, it is taken as unconstrained otherwise.

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Table 1. Subjective measure of variance of income growth (average values).

	real variance	**nominal variance**
entire sample	0.000411	0.000106
age group		
<=30	0.000414	0.000161
31-40	0.000786	0.000136
41-50	0.000353	0.000118
51-65	0.000313	0.000087
>65	0.000320	0.000084
education		
junior high school or less	0.000344	0.000092
high school	0.000577	0.000118
university degree or more	0.000473	0.000191
occupation		
wage earner	0.000526	0.000128
self employed	0.000337	0.000105
region of residence		
north	0.000261	0.000072
centre	0.000517	0.000116
south	0.000566	0.000147
risk aversion		
risk averse	0.000512	0.000119
risk neutral	0.000859	0.000202
risk lover	0.000313	0.000092
household wealth		
I quartile	0.000604	0.000120
II quartile	0.000454	0.0001085
III quartile	0.000297	0.000084
IV quartile	0.000343	0.000113

This table shows the average values of the nominal and real measure of conditional variance of income growth. Average values are calculated by different groups: age classes, occupation, education, area of residence, risk aversion and wealth quartiles. Households are classified as risk averse, risk neutral or risk lover if in the 1995 wave of SHIW they report to be willing to pay an amount higher, equal or lower to 10 million for an hypothetical asset which would permit them with the same probability to gain 10 million, or to lose all the capital invested.

Table 2. – Panel estimation

	(1)	(2)	(3)	(4)
Varredn	7.266***	8.556***	9.417***	8.897***
	(2.439)	(2.076)	(1.892)	(1.913)
Eredn	-0.0329	0.167	0.208	0.207
	(0.0921)	(0.169)	(0.169)	(0.170)
wrisk		3.23e-07**		4.06e-07***
		(1.48e-07)		(1.55e-07)
male (dummy)	0.0134	0.0443	0.0413	
	(0.0188)	(0.0297)	(0.0302)	
age	-0.000244	-0.000298	-4.23e-05	0.000981
	(0.000661)	(0.000989)	(0.000987)	(0.000954)
Dncomp	0.408***	0.434***	0.441***	0.439***
	(0.0407)	(0.0594)	(0.0573)	(0.0580)
Constant	0.0574	0.0216	-0.00762	-0.00477
	(0.0395)	(0.0588)	(0.0594)	(0.0476)
Observations	3629	1745	1663	1663

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable is the log rate of growth of non-durable consumption expenditures. *Eredn* is the expected rate of growth of nominal income, whereas *Varredn* is the variance of income rate of growth. Each estimation also include year dummies, interaction between year dummies and dummies for education, occupation and geographical area. In specification (1) estimation is carried out using all the observations, whereas in specification (2) the sample size reduces, since an interaction term between household's risk aversion and net wealth (*wrisk*) is included. In specification (3) and (4) only households who report being risk averse are included in the estimation. Specification (4) includes *wrisk* among explanatory variables. Standard errors are corrected for heterosckedasticity of unknown form.

Table 3.1- Cross-sectional estimation

	(1)	(2)	(3)	(4)
Eredr	-0.134	0.0471		
	(0.121)	(0.212)		
Varredr	8.466***	9.273***	7.169***	11.37**
	(2.192)	(3.177)	(2.148)	(5.187)
male (dummy)	-0.0101	0.0322	-0.0158	0.0139
	(0.0231)	(0.0395)	(0.0218)	(0.0476)
age	0.00136**	0.00230**	0.000832	0.00290
	(0.000652)	(0.00109)	(0.000601)	(0.00242)
farmer (dummy)	0.0152	0.0297	0.0155	0.0225
	(0.0468)	(0.0749)	(0.0461)	(0.0806)
year 1991	-0.0814***	0	-0.109***	-0.0193
	(0.0171)	(0)	(0.0157)	(0.0961)
entrepreneur	-0.0532**	-0.0738**	-0.0175	-0.151
	(0.0228)	(0.0372)	(0.0217)	(0.142)
Dncomp	0.482***	0.489***	0.274***	0.978
	(0.0486)	(0.0818)	(0.0461)	(0.739)
wrisk		3.88e-07*		
		(2.15e-07)		
DY			0.300***	-0.732
			(0.0218)	(1.069)
Constant	-0.135**	-0.208*	-0.0884	-0.266
	(0.0656)	(0.119)	(0.0614)	(0.216)
Observations	2311	972	2299	2299

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable is the log rate of growth of non-durable consumption. Each regression also includes education dummies and 21 regional dummies (not reported for brevity). Specification (1) reports results of OLS regression performed on the whole sample. In specification (2) sample size reduces, since the interaction term between absolute risk aversion and household net wealth (*wrisk*) is included. In specification (3) the log rate of growth of household income is included in the estimation instead of the subjective measure (*eredr*). Finally, in specification (4) IV estimation is performed, using *eredr* as instrument for DY.

Table 3.2 (a) - Sample split

	(1)		(2)		(3)	
Eredr	-0.0389	-0.170				
	(0.860)	(0.124)				
Varredr	18.40**	8.120***	16.91**	6.826***	17.96*	12.33*
	(8.168)	(2.346)	(8.066)	(2.367)	(10.42)	(6.676)
male	-0.146	-0.00782	-0.127	-0.0139	-0.135	0.0263
(dummy)	(0.186)	(0.0233)	(0.181)	(0.0220)	(0.191)	(0.0609)
age	0.000342	0.00148**	0.000844	0.000909	0.000542	0.00378
	(0.00527)	(0.000665)	(0.00534)	(0.000611)	(0.00576)	(0.00329)
farmer	0.217	0.00878	0.240	0.00904	0.230	0.0212
(dummy)	(0.205)	(0.0486)	(0.211)	(0.0481)	(0.223)	(0.104)
year=1991	-0.0779	-0.0759***	-0.101	-0.103***	-0.0903	0.0104
	(0.103)	(0.0174)	(0.103)	(0.0160)	(0.130)	(0.122)
entrepren.	-0.112	-0.0534**	-0.0472	-0.0188	-0.0689	-0.190
(dummy)	(0.110)	(0.0234)	(0.104)	(0.0222)	(0.224)	(0.182)
Dncomp	0.470	0.488***	0.196	0.280***	0.303	1.187
	(0.359)	(0.0492)	(0.375)	(0.0466)	(0.912)	(0.954)
DY			0.238*	0.301***	0.106	-1.030
			(0.132)	(0.0222)	(1.078)	(1.381)
Constant	0.0242	-0.136**	-0.0977	-0.0830	-0.0308	-0.337
	(0.340)	(0.0677)	(0.331)	(0.0634)	(0.616)	(0.300)
Obs.	93	2218	91	2208	91	2208

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

Table 3.2 (b) - Sample split

	(4)		(5)	
Eredr	-0.0917	-0.173	-0.0854	-0.160
	(0.409)	(0.129)	(0.192)	(0.155)
Varredr	17.81*	7.508***	9.764*	7.433***
	(9.236)	(2.541)	(5.459)	(2.761)
male	0.0542	-0.0215	0.0344	-0.0262
(dummy)	(0.0671)	(0.0250)	(0.0354)	(0.0308)
age	0.00131	0.00168**	0.00232**	0.00141
	(0.00178)	(0.000705)	(0.000971)	(0.000899)
farmer	-0.238	0.0433	-0.122	0.0510
(dummy)	(0.193)	(0.0474)	(0.0931)	(0.0548)
year=1991	-0.121**	-0.0739***	0.105***	-0.0710***
	(0.0551)	(0.0182)	(0.0297)	(0.0215)
entrepren.	-0.125	-0.0489**	-0.0859**	-0.0415
(dummy)	(0.0836)	(0.0238)	(0.0401)	(0.0279)
Dncomp	0.611***	0.466***	0.481***	0.476***
	(0.152)	(0.0511)	(0.0818)	(0.0613)
DY				
Constant	-0.228	-0.148**	-0.411***	-0.0841
	(0.171)	(0.0723)	(0.101)	(0.0897)
Obs.	255	2056	813	1498

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In tables 3.2 (a) and 3.2 (b) the dependent variable is the log rate of growth of non-durable consumption. Each regression also includes education dummies and 21 regional dummies (not reported for brevity). Specification (1) reports result of a sample split using *lb1*. In specification (2) DY is used in the estimation instead of eredr, whereas in specification (3) IV estimation is performed (eredr is used as instrument for DY). In specification (4) and (5) two alternative indicators of liquidity constraints (*lb12* and *lb23* respectively) are used in the estimation.

Table 3.3 (a). Switching regression

	(1)		
	$\Delta \ln C^U$	$\Delta \ln C^C$	select
Eredr	-0.144	-0.123	-0.576
	(0.120)	(0.510)	(0.724)
Varredr	6.667***	22.43**	17.80
	(2.015)	(8.739)	(13.33)
male	0.00364	0.104	0.319*
(dummy)	(0.0231)	(0.169)	(0.189)
age	0.00105*	-0.0145***	-0.0206***
	(0.000615)	(0.00501)	(0.00398)
farmer	-0.00131	0.191	-0.168
(dummy)	(0.0522)	(0.152)	(0.289)
entrep.	-0.0502**	-0.0596	0.0672
(dummy)	(0.0232)	(0.109)	(0.132)
undergrad.	0.0220	0.507***	0.147
(dummy)	(0.0290)	(0.155)	(0.182)
Dncomp	0.481***	0.0791	-0.390
	(0.0492)	(0.286)	(0.269)
n^bank			-27.99***
counters			(6.792)
acom2*bank counters			3.441
			(5.168)
acom3*bank counters			1.957
			(5.402)
acom4*bank counters			1.350
			(6.326)
W			-2.27e-09

			(4.73e-07)
W2			-0.0000008
			(0.000001)
South	-0.00931	0.0968	
	(0.0168)	(0.147)	
Constant	-0.115**	-0.477	-0.681*
	(0.0450)	(0.642)	(0.358)
Rho0	-0.18148		
	(0.15046)		
Rho1	0.80833***		
	(0.24143)		
Wald test of indep. eq.. Prob > chi2	0.0771		
Observations			
	2311	2311	2311

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Table 3.3 (b). Switching regression

	(2)			(3)		
	$\Delta \ln C^U$	$\Delta \ln C^C$	select	$\Delta \ln C^U$	$\Delta \ln C^C$	select
Eredr	-0.138	0.0716	-0.0730	-0.163	-0.0429	0.902*
	(0.128)	(0.341)	(0.664)	(0.151)	(0.183)	(0.489)
Varredr	6.153***	13.97**	3.920	6.402***	8.813	-5.451
	(2.195)	(6.875)	(12.80)	(1.998)	(5.361)	(11.86)
male	0.00713	0.0694	-0.0868	0.00560	0.0410	-0.173**
(dummy)	(0.0255)	(0.0626)	(0.102)	(0.0321)	(0.0358)	(0.0799)
age	0.00179***	-0.000329	-0.0134***	0.00104	0.00172**	-0.0128***
	(0.000648)	(0.00169)	(0.00274)	(0.000828)	(0.000857)	(0.00231)
farmer	0.0362	-0.258	-0.261	0.0519	-0.103	-0.365*
(dummy)	(0.0525)	(0.186)	(0.232)	(0.0599)	(0.0962)	(0.194)
entrep.	-0.0322	-0.0923	-0.0851	-0.0479*	-0.0639	0.637***
(dummy)	(0.0238)	(0.0809)	(0.124)	(0.0278)	(0.0400)	(0.105)
undergrad.	0.0395	0.262**	-0.0157	0.0289	0.0828*	0.558***
(dummy)	(0.0302)	(0.115)	(0.176)	(0.0369)	(0.0476)	(0.168)
Dncomp	0.462***	0.561***	-0.175	0.464***	0.478***	-0.103
	(0.0519)	(0.149)	(0.208)	(0.0610)	(0.0799)	(0.174)
n^bank			-14.56***			9.911***
counters			(5.471)			(3.627)
acom2*bank c.			4.051			4.639
			(4.209)			(3.374)
acom3*bank c.			0.625			11.16***
			(3.671)			(2.888)
acom4*bank c.			6.177			29.97***
			(5.029)			(5.095)
W			-3.61e-06***			-6.97e-06***

			(5.94e-07)			(7.08e-07)
W2^2			0.0000007***			0.0000006***
			(0.0000001)			(0.0000001)
South	-0.0224	0.0119		-0.0346*	0.0590**	
	(0.0174)	(0.0434)		(0.0198)	(0.0266)	
Constant	-0.123**	-0.0734	0.381*	-0.0769	-0.171***	0.704***
	(0.0484)	(0.123)	(0.228)	(0.0667)	(0.0626)	(0.183)
Rho0	-0.48637***			-0.21110		
	(0.09018)			(0.10299)		
Rho1	-0.02570			-0.08713		
	(0.17474)			(0.06645)		
Wald test of indep. eq.						
Prob > chi2	0.0000			0.0571		
Observations	2311	2311	2311	2311	2311	2311

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Tables 3.3 (a) and 3.3 (b) shows results of the endogenous switching regression. The dependent variable in the main equation is the log change in non durable consumption for constrained ($\Delta \ln C^C$) and unconstrained ($\Delta \ln C^U$) households, respectively. *lb1, lb12* and *lb23,* respectively, are used to classify observations as constrained/unconstrained. All specifications also include year dummies. *acom2*, *acom3* and *acom4* are dummies which take value 1 if the households lives in a municipality with a number of inhabitants between 20,000 and 40,000, between 40,000 and 500,000, and higher than 500,000, respectively.

Table 4.1- Expected constraints-sample split

	(1)		(2)	
	constr.	unc.	constr.	unc.
Eredr	-0.298	-0.0709	-0.370	-0.0583
	(0.239)	(0.136)	(0.269)	(0.134)
Varredr	11.62***	8.455***	10.12**	8.594***
	(3.794)	(2.426)	(4.029)	(2.431)
male (dummy)	0.00750	-0.0145	0.0216	-0.0153
	(0.0466)	(0.0269)	(0.0544)	(0.0257)
age	0.00143	0.00142*	0.00176	0.00147**
	(0.00133)	(0.000758)	(0.00157)	(0.000742)
farmer (dummy)	-0.274*	0.0602	-0.205	0.0492
	(0.156)	(0.0516)	(0.168)	(0.0519)
year=1991	0.109**	-0.0649***	-0.104*	-0.0677***
	(0.0452)	(0.0184)	(0.0570)	(0.0180)
entrepreneur (dummy)	-0.0324	-0.0588**	-0.0621	-0.0538**
	(0.0855)	(0.0238)	(0.0819)	(0.0237)
Dncomp	0.399***	0.490***	0.500***	0.465***
	(0.110)	(0.0540)	(0.120)	(0.0528)
Constant	-0.378***	-0.131*	-0.248*	-0.150**
	(0.128)	(0.0758)	(0.134)	(0.0737)
Observations	385	1926	321	1990

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The dependent variable is the log rate of growth of non-durable consumption. Each regression also includes education dummies and 21 regional dummies (not reported for brevity). The estimated probability of being constrained in the future is used in order to classify households as constrained/unconstrained. Actually, an household is classified as constrained if the probability of being constrained is higher than 10% (specification 1) or 20% (specification 2).

Table 4.2 - Conditional probability of future liquidity constraints sample split and switching regression

	(1)		(2)		
	constrain.	unc.	$\Delta \ln C^U$	$\Delta \ln C^C$	select
Eredr	-0.279* (0.158)	0.103 (0.174)	0.156 (0.168)	-0.324** (0.157)	-0.526 (0.478)
Varredr	17.01*** (6.544)	6.440** (2.603)	3.870 (2.934)	16.44** (6.643)	-27.82* (14.73)
male (dummy)	-0.00824 (0.0306)	0.0186 (0.0373)	-0.00187 (0.0377)	-0.0181 (0.0308)	-0.775*** (0.0935)
age	0.00124 (0.000951)	0.00312*** (0.00106)	-0.00169 (0.00131)	-0.000352 (0.00108)	-0.0542*** (0.00264)
farmer (dummy)	-0.0271 (0.0636)	0.135* (0.0726)	0.158** (0.0783)	-0.0286 (0.0633)	0.444** (0.200)
year=1991	-0.0636*** (0.0221)	-0.0868*** (0.0269)	-0.0798*** (0.0278)	-0.0642*** (0.0220)	0.0145 (0.0752)
entrep. (dummy)	-0.0458* (0.0269)	-0.112** (0.0432)	-0.0583 (0.0446)	-0.0327 (0.0265)	0.232** (0.0971)
Dncomp	0.461*** (0.0642)	0.477*** (0.0755)	0.469*** (0.0757)	0.461*** (0.0645)	0.0637 (0.185)
Undergraduate (dummy)			0.0371 (0.137)	0.0652* (0.0348)	1.885*** (0.265)
living in the south			-0.0422 (0.0428)	-0.0142 (0.0222)	
n. of bank counters					-74.62*** (6.530)
acom2*bank counters					37.51***

					(4.437)
acom3*bank counters					35.04***
					(3.749)
acom4*bank counters					13.15***
					(4.449)
W					2.55e-06***
					(2.33e-07)
W2					-0.0000008***
					(0.0000002)
Constant	-0.0657	-0.315***	0.224**	0.0176	4.638***
	(0.0906)	(0.0975)	(0.109)	(0.0583)	(0.257)
Rho1			0.2126**		
			(0.0867)		
Rho0			0.4818***		
			(0.0961)		
Wald test of indep. eq. Prob > chi2			0.0000		
Observations	1363	948	2311	2311	2311

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

The dependent variable is the log rate of growth of non-durable consumption. Each regression also includes education dummies and 21 regional dummies (not reported for brevity). The estimated probability of being constrained in the future (given that the household has asked for credit) is used in order to classify households as constrained/unconstrained. Actually, an household is classified as constrained if the probability of being constrained is higher than 60%

CHAPTER 2

PRECAUTIONARY SAVING, FINANCIAL RISK AND PORTFOLIO CHOICE.

Abstract

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 precautionary motive for saving. In particular, I focus on the role played by financial risk on households' saving decisions. Actually, households investing mainly in safe assets do not need to protect themselves against future and unexpected financial losses. Consequently, controlling for households' sources of risk beside financial ones, the amount of precautionary savings of a household who invest exclusively in safe assets should be lower compared to households who instead detain a non-negligible share of risky assets in their portfolio. Moreover, portfolio diversification, reducing households' total exposure to financial risk, should reduce the amount of wealth households need to save for precautionary reasons. In this paper, I provide an empirical assessment of the linkage existing between the composition of households' portfolio and the amount of wealth households wish to have to protect themselves against unexpected contingencies. 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. However, households do not seem to use portfolio diversification to reduce exposure to total risk. Finally, I address the issue of complementarity vs. substitution between formal and informal insurance schemes. Actually, trust in capital market would lower substantially the amount of wealth households wish to detain for precautionary reasons. However, there is no evidence in favour of a negative and strong linkage between precautionary saving and insurance.

Keywords: portfolio choice, precautionary saving.
Jel classification: G11, E21, C21

1.Introduction

People save not only for expected rainy days, but also in prevision of unexpected contingencies (precautionary saving). As pointed out by Kimball (1991), households respond to risk by accumulating assets, especially liquid ones which can be easily sold in case an unexpected event occurs.

Moreover, households tend to reduce exposure to other risks when facing an additional and unavoidable risk, 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 background risk and portfolio allocation (i.e. Heaton-Lucas, 2000; Hochguertel, 2003). Actually, 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 decisions (Dreze and Modigliani, 1972). Uncertainty affects consumption and saving decisions as well as portfolio allocation.

Actually, 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 household's attitudes towards risk, I try to establish a link between portfolio composition and precautionary saving in a novel way. I exploit a question present in the 2002 wave of the Bank of Italy Survey of Household Income and Wealth (SHIW), which is patterned after a similar question in the Survey of Consumer Finances (SCF) (Kennikell and Lusardi, 2004). Italian households were asked to quantify the amount of wealth they would like to own in prevision of 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 about precautionary behavior relating to a unique source of risk - typically income risk- to 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 *effective* one, allows 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].

[1]Since wealth may be invested in risky assets, analyzing the effect of risky asset ownership on wealth holdings is kind of tautological. Actually, 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.

Following Kennikell and Lusardi (2001) I use the subjective measure of target wealth instead of effective 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 Kennikell 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 response of current spending 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 the strand of literature (Guiso, Jappelli, Terlizzese, 1992 among others) investigating the effect of income risk on portfolio choices. However, I deviate from both strands of literature in several ways. On one hand, using the subjective measure of precautionary wealth rather than measures of effective 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 towards zero. On the other 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 Kennikell and Lusardi's (2001) 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 of all, I empirically assess whether households whose wealth is exclusively invested in safe assets show a lower desired precautionary wealth than those who instead own a non-negligible share of risky assets in their portfolio. Actually, a household which invests exclusively in safe assets, does not need to protect itself against future and unexpected financial losses. Consequently, controlling for attitudes towards 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 the household detains in its portfolio. However, such an index does not take into account the possibility that households' wealth is unevenly invested in the portfolio. Therefore, I use an alternative index of portfolio diversification, the inverse of the Herfindhal index, which is derived as a weighted average of the wealth invested in every asset.

The empirical analysis strongly supports the hypothesis of a negative correlation between risky asset ownership and precautionary saving. Moreover, controlling for demographic and personal characteristics, I found evidence of a negative 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.
Actually, variables regarding portfolio composition may be affected by endogeneity. In other words, there may be unobservables (related to household-specific plans for the future or attitudes towards risk) that may influence both the amount of desired precautionary saving and portfolio composition. However, previous results still hold when potential endogeneity of financial variables is considered.
Finally, I address the issue of formal versus informal insurance schemes. Actually, financial markets provide households with plenty of insurance schemes to face unexpected events, such as damage, illness or death. Guiso and Jappelli (1998), using Italian microdata, show that the probability of buying insurance is positively and significantly correlated with a subjective measure of earnings uncertainty. Actually, if agents' preferences are characterized by decreasing absolute prudence, the presence of uninsurable risk makes households more prone to buy further insurance against other risks that are insurable.
Depending on the degree of trust towards financial markets, households might indeed choose between formal (i.e. insurance schemes) or informal (saving, help from parents/friends) ways to protect themselves against unexpected events. In this perspective, previous literature (Starr-McCluer, 1996; Guariglia and Rossi, 2001) emphasized a substitutability between insurance and precautionary saving.
Using a subjective measure of desired precautionary saving, it is possible to re-investigate the linkage existing between formal and informal insurance schemes in a novel way. Actually, the self reported measure of desired wealth makes it possible to take into account forms of risks beyond income risk. On this basis, one can investigate whether substitutability between formal insurance schemes and precautionary accumulation for all kinds of unexpected events.
The linkage between desired precautionary savings and insurance is then investigated empirically. There is a negative but not significant effect of insurance ownership on precautionary accumulation. There is no strong evidence indeed that the more a household relies on capital markets, using formal insurance schemes against unexpected events, the lower the amount of desired precautionary savings will be.
In the paper, I will proceed as follows. In the second section, a brief review of the literature about precautionary saving and households' portfolio choice is presented. In the third part, data used in the empirical analysis and some descriptive statistics are shown. In the fourth section, the description of the empirical analysis based on the subjective measure of precautionary wealth is presented, whereas section 5 presents empirical results. In section 6, the effect of the share of risky assets in households' portfolio and portfolio diversification are taken into account. In section 7, the complementarity/substitution issue between precautionary saving and formal insurance schemes is addressed. In the last part, some conclusions are drawn.

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 more 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, Jappelli and Terlizzese (1992) 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 among different sources of risk needs to be taken into account.
The existence of idiosyncratic risks that are not fully insurable (background uncertainty) may induce indeed 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. Actually, 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 (1993)'s property of standard risk aversion precautionary saving will be predominantly allocated on the risk-free asset[2].
Guiso, Jappelli and Terlizzese (1996), using a cross section of Italian households, provide an empirical assessment of the linkage existing between portfolio choice and background uncertainty. Using a subjective measure of earnings uncertainty , they estimate the share of risky assets in households' portfolio. They eventually found a negative and significant correlation between earnings uncertainty and ownership of risky assets. Moreover, expectation of future borrowing constraints induce 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 the 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 (1996) show that the presence of non-tradable labour risk increases the demand for insurance against insurable risks. Their result strongly support the existence of spillover effects across independent risks.
Grande and Ventura (2002) focus on the role played by capital market in trading away asset-specific risk on 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 eventually found Italian households to react significantly to the first, 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 was taken from the 2002 wave of the Survey of Household Income and Wealth (SHIW) carried out biannually by the Bank of Italy. The sample includes about 8,000 households

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

and 24,000 individuals[3] each year. The 2002 wave of SHIW includes 8011 observations. For robustness checks, pooled OLS and panel random effect analysis will be performed using the 2004 wave of SHIW[4].

For our purposes, the SHIW has several advantages. The survey is rich with information on household social, demographic and economic characteristics. Moreover, household portfolios are described in details, providing us with information about whether and how much of 22 financial instruments, and three types of insurance (property, life and health)[5] are owned by Italian families.

Furthermore, the 2004 survey contains a question that allows us to measure households' propensity towards risk based on a subjective question in which the respondent is asked to select their preferred financial investments among the following:

1 = high risk of losing part 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[6].

This question was not asked in the 2002 survey. However, since we can assume risk aversion to be constant over the life cycle, we can impute the coefficient of risk aversion to those households who were interviewed in 2002 and 2004[7].

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?

Using a similar question in the Survey of Consumer Finance, Kennikell and Lusardi (2004) described in detail the determinants of precautionary savings. Further, Jappelli, Padula and Pistaferri (2006) exploit the same information to directly test the buffer stock hypothesis on Italian data[8].

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[3]See Biancotti et al. (2004) for a detailed description of 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]See the appendix for a detailed description of financial variables.

[6] An alternative measure is the one used by Guiso and Paiella (2004).

[7]See, at this regard, Paiella and Chiappori (2008) and Brunnermeier, and Nagel (2008). Using data from PSID and SHIW, respectively, they show that households' investment in risky assets show a very low (and statistically insignificant) elasticity to wealth fluctuations. In this sense, households' risk aversion cannot be considered as time varying.

[8] It is worth noticing that the desired amount of precautionary wealth held by Italian households is much higher than the correspondent measure for US households. As Jappelli, Padula and Pistaferri (2006) point out, that difference may be imputed to an higher degree of income risk and a lower degree of development of financial markets. The

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 *effective* wealth, as done by previous literature, provides a better way to elicit the extent of precautionary accumulation. First of all, 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. Secondly, 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, formal and informal insurance schemes (Kennikell and Lusardi, 2004)[9]. Finally, this piece of information provides us with a comprehensive measure of risk, including not only income risk, but 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, 1992; Lusardi, 1999). Some contributions (eg. Guiso, Jappelli and Pistaferri, 1996) 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 to go one step further than previous literature. On one hand, it enables to take into account different sources of risk beyond income risk. Actually, households reduce exposure to unavoidable risk by reducing exposure to other risks, even when the other risks are statistically independent of the first (Kimball, 1991). 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.
As far as the definition of risky asset is concerned, following Guiso, Jappelli and Pistaferri (1996), and Bertocchi, Brunetti and Torricelli (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. However, as pointed out by Bertocchi, Brunetti and Torricelli (2009) long-term government bonds and investment funds can be considered fairly safe. Moreover, investment funds are a form of managed investment characterized by high diversification. As far as long-term government bonds are concerned, thanks to the post- 1996 fiscal stabilization, it is possible to attach a relatively low risk to these assets (Guiso and Jappelli, 2002).
In order to detect household portfolio composition we first need to take into account whether

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median ratio of target wealth to total wealth for Italian household is 0.31, and 3.32 if wealth includes only financial assets. Kennickell and Lusardi (2004) report instead 0.08 and 0.2 respectively.

[9]Actually, as Kennikell and Lusardi (2004) point out, using this subjective measure is not free from measurement errors. For example, it might be that households do not understand very well the question. However, they notice that this is a problem related to all literature which use subjective measures.

households owns any risky asset in their portfolio.
Two dummies are introduced, ***port_safe1*** and ***port_safe2.*** They take value 1 if the portfolio is exclusively made of safe assets, and 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 demographical and financial variables.
The desired amount of precautionary savings tend 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.
Actually, households whose portfolio is 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, reporting a higher amount of wealth to face unexpected contingencies.
Last but not least, 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 the first definition, a household is constrained if its request for a loan was rejected, or if it is 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). According to that, a household is constrained if its wealth is greater than 6 months' income[10]. Actually, insignificant differences in the ratio of precautionary saving/permanent income are 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 indexes will be used.
The first one is simply the inverse of the Herfindhal 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 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 few

[10]Actually, 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.

assets. As explained in the appendix, ***div_index1*** is calculated including all 22 financial assets. ***Div_index2*** and ***div_index3*** 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 instead simply the number of assets households own in their portfolio. Actually, using this measure does not allow taking into account assets distributed unevenly in the portfolio. Therefore, 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 taken into account, the value of the diversification index averages around 15%. When ***ndiv_index*** is used, previous results are confirmed. On average, Italian households own less than two financial assets in their portfolio.
Table 4.1, 4.2 and 4.3 show 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. In fact, only a small percentage of households own more than 3 assets in their portfolio.
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 Kennikell and Lusardi (2004), I estimate the determinants of desired precautionary savings taking into account different 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 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 instead own some 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 Kennikell and Lusardi (2004) and Guariglia (2001) as far as the empirical specification is concerned. The log of desired precautionary saving scaled by permanent income is used as a dependent variable, $\ln(precaut\_y)_i$. The logarithm of permanent income is included in the right hand side[11]. Actually, 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:

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

[11]Permanent earnings are calculated following the procedure proposed by Guiso, Jappelli and Terlizzese (1992). See the appendix for further details.

where $port\_safe_i$ is a dummy which takes value 1 if the households own exclusively safe asset in their portfolio, and 0 if he owns at least one risky asset. var_i represents labour income variance, calculated over 6 waves of the SHIW. It is included in the estimation in order to control for earnings variability[12].

DEM and FIN are respectively a set of and financial variables that may affect the desired amount of precautionary savings. The set of demographic indicators includes age, age squared, education dummies, 21 geographical dummies, family size, a dummy indicating whether the number of income recipients is greater than one, and occupational dummies. As far as financial variables are concerned, 2 dummies indicating whether the household 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. Actually, ownership of one or more credit cards, 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. Finally, wealth quartile dummies are included, in order to control for the level of wealth[13].

5. Results

Table 5.1 and 5.2 present the estimation results using ***port_safe1*** and ***port_safe2*** , respectively. Precautionary saving appears to be increasing in wealth; wealth dummies are significant at 1% level. Looking at ***port_safe1*** and ***port_safe2*** , we notice that they are both negative and significant at 1% 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. Actually, earning risk is positive and weakly significant (10% level) when ***port_safe1*** is included in the estimation, whereas is not significant using ***port_safe2***.

Moreover, desired precautionary saving increases with family size; intuitively, the higher the number of components in the household, the higher the probability some unexpected event (i.e illness) will happen to some of them. The coefficient associated to the income recipients dummy, as expected, is negative, albeit not significant. Finally, home ownership is significantly negatively correlated with desired precautionary saving.

In order to control for households' attitudes towards risk, a dummy which takes value 1 if the

[12]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.

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

household is risk averse is included in the estimation (specification 2). Actually, the dummy is derived by a specific question present in 2004 wave of SHIW (see Bertocchi, Brunetti and Torricelli, 2009). Since only households who were interviewed in 2004 and 2002 wave of SHIW were included, the sample size shrinks to 1006 observations. Actually, Kimball and Weil (1992) show that greater risk aversion tends to increase the strength of the precautionary saving motive. The coefficient associated to risk aversion is indeed positive, as expected, but not significant. 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 counters in a region is included in specification (3) 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 counters and four dummies for town size are included[14]. Actually, the total effect of the number of bank counters is positive and significant. However, it turns out to be negative 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 4) earnings variability becomes greater and more significant in table 5.2, whereas it remains significant in table 5.1[15]. Moreover, in order to control for health risk, in specification 4 a variable indicating the number of illness days is introduced 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 makes the need to save for future illness less preponderant .
Finally, in specification (5) of tables 5.1 and 5.2, a random effect panel estimation is performed using the 2002 and 2004 waves of the SHIW. Previous results regarding financial risk significance remains basically unaffected.

5.1 Endogeneity issues

In the previous section, ownership of risky assets has been found strongly correlated with desired precautionary saving. However, OLS regression might be plagued by an endogeneity problem. First of all, risky asset ownership is correlated with unobserved factors, possibly related to household-specific plans for the future and attitudes towards risk, which also affect the reported amount of precautionary saving. Intuitively, a household with a relatively high level of knowledge of financial market would probably use insurance schemes to protect himself against insurable risks (i.e. death, illness, damage to property). Further, he would adequately diversify his portfolio, so that overall financial risk is reduced.

[14]Data comes from the Bank of Italy "Base Informativa Pubblica".
[15]The fact that income risk is not significant in the whole sample when port_safe2 is used does not contradict the strand of literature which found evidence in favor of precautionary saving using effective or subjective measures of income variance. It is straightforward noticing that labor income risk is not likely to affect the behavior of retired and unemployed households.

Secondly, the decision to own risky asset strongly depends on households' perception of future unexpected events. In this sense, a household might not invest in risky asset because he need an higher amount of wealth to face unexpected events. Similarly, a household may diversify his portfolio because he already needs an high amount of wealth to face other risks.
Previous estimation results should be therefore estimated using instrumental variables. However, the choice of plausible instruments for the endogenous variable is somewhat tricky. Actually, we can assume the decision to invest in risky assets to be correlated with the knowledge of such instruments. As showed 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. The level of education and the length of relationship with the bank are therefore used as proxies for financial literacy. 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.
In table 6.1, education and the length of relationship with the bank are used to instrument ***port_safe1*** and ***port_safe2*** [16]. Actually, ***port_safe1*** and ***port_safe2*** are found negative and significant at 1% level even when the endogeneity issue is taken into account.
Moreover, *dummy _ help* is negative and significant at 5% level. This is in favor of 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 6.2).
In table 6.3, ***port_safe1*** and ***port_safe2*** are instrumented using years of education, the length of the relationship with the bank and risk aversion indicator, which turns out to be strongly correlated with ownership of risky asset[17]. Even in this case, portfolio ownership dummies are found to be negative and strongly significant.
Finally, in the appendix (table F) a robustness check is presented. IV estimation is performed excluding education as instrument for portfolio dummies. Actually, an alternative instrument, indicating whereas the household head used forms of remote connection with the bank or with financial institution is used. Portfolio dummies are still significant at 5% and 10% level.

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 of relatively risky assets affects households' saving for unexpected contingencies. However, taking into account only the ownership of risky assets is only one side of the coin.
On one hand, what matters is not just the fact of holding risky assets, but their weight compared to the overall wealth held. On the other hand, households might indeed exploit portfolio diversification in order to reduce 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

[16]Actually, I tried to include parental level of education as an additional instrument. Results are basically unchanged.
[17]Look at the appendix for the result of first stage regression.

reduction of precautionary saving. From this perspective, the influence of portfolio diversification on households' desired precautionary saving is twofold. On 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 7.1 and 7.2 show the results of the instrumental variable estimation. As well as ownership of risky assets, the share of risky assets, and portfolio diversification indexes should be treated as endogenous variables. A simultaneity issue indeed exist. 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 towards risk, but it 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 7.1 shows results of IV regression using years of education and the length of the relationship with a bank as instruments, whereas in table 7.2 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 indexes, 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 portfolio's total riskiness, risky assets convey sector specific shocks, giving rise to higher precautionary savings.

7. Formal and informal insurance schemes

Finally, I test whether ownership of health or property insurance affects the desired amount of wealth households would like to save for precautionary reasons.
In the literature several contributions have analyzed the linkage between private saving and insurance decisions. Starr-McCluer (1996) evaluates the impact of private health insurance on American households' saving habits to verify the existence of substitutability between private insurance and self insurance. The author concludes that, in general, precautionary savings does not offset private insurance. A similar conclusion is reached by Guariglia and Rossi (2001) using British household data. As far as the Italian case is concerned, Jappelli, Pistaferri and Weber (2004), focus on the impact of health risk on precautionary saving. They eventually found a higher degree of precautionary saving in areas with poor quality health services.
In order to see whether substitutability exists between formal and informal insurance schemes, the dummy ***insurance*** is introduced. It takes value 1 if the households owns a property insurance or health insurance, zero otherwise. Since insurance ownership is a choice variable, its endogeneity needs to be tackled.
Table 8.1 reports the results of IV estimates, where port_safe1, port_safe2 and insurance are instrumented using years of education, risk aversion, the length of the relationship with the bank and the number of bank counters per capita. Table 8.2 instead shows IV estimates using ***share_narrow***, ***share_broad***, ***dindex1*** and ***ndindex1***, instrumented with the same set of

instruments used in table 8.1.
As tables 8.1 and 8.2 show, the decision to buy an insurance is negatively correlated to the desired amount of precautionary savings. Therefore, substitutability exists between self-insurance (precautionary saving) and formal insurance schemes. Households who trust financial markets prefer to insure against unexpected contingencies through financial instruments (i.e. buying an insurance) instead of saving[18]. However, ***insurance*** is not significant. In this perspective, although Italian households use insurance instruments in order to face unexpected and future losses, they do not significantly reduce the amount of wealth they wish to detain for precautionary reasons. Actually, this may be due to the fact that losses that can be insured (i.e. illness, damage) are not perceived to be as important as those who do not (i.e unemployment, financial market related losses). On the other hand, the explanation of the weak substitutability between formal and informal insurance markets may be also founded on Italian households' relatively little trust on capital markets.

8. Conclusion

In this paper I have explored how saving decisions of Italian households respond to asset-related risk. Unlike previous works about precautionary saving, a household specific measure of desired precautionary wealth is used in the empirical analysis. The advantage in using a self-reported measure of precautionary wealth is twofold. First of all, it is a comprehensive measure, which includes all possible sources of risk. Secondly, using such a measure 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 use precautionary saving to protect themselves against 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).
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. Albeit financial instruments convey sector-specific shocks, provided that assets' return are not perfectly correlated, an adequately diversified portfolio should help reducing total riskiness of 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 of households' financial diversification index (i.e. all assets, risky assets in a broad and narrow definition), and to different computations of this index.

[18]However, the over identification test is not rejected in specifications (3) and (4). Thus, the estimates should be taken with care.

Finally, a substitution effect does not seem to exist between formal insurance schemes and precautionary saving. Using formal insurance schemes to insure themselves against specific kinds of risk (i.e. health, damage and death) does not reduces the amount of desired precautionary savings.

The role played by financial risk on precautionary savings has important policy implications. As Levine (1991) pointed out, a well developed stock market allows households to diversify their portfolios, enabling them to hedge against idiosyncratic risks. It is straightforward noticing that a higher degree of development of financial markets would allow households to better insure against unexpected events. On one hand, a well diversified portfolio would allow them to better hedge against idiosyncratic risks. On the other hand, adequate insurance schemes would potentially help individuals to deal with specific kinds of risk.

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APPENDIX

(A) VARIABLES DEFINITION

precaut: desired amount of precautionary saving.
YP: permanent income
ln (precaut): logarithm of households' reported desired precautionary wealth.
ln(precaut_y): ln(precaut/permanent income).
ln(YP): logarithm of permanent income
age: age of the household head
age5: age classes. Coded as: (1) age $\leq$ 30; (2) 31 $\leq$ age $\leq$ 40; (3) 41 $\leq$ age $\leq$ 50; (4) 51 $\leq$ age $\leq$ 65; (5) age $\geq$ 65.
south: dummy variable, takes value 1 if the household lives in the south, 0 otherwise.
acom5: dummy variable, takes value 1 if the household lives in a city where the number of inhabitants is greater than 50000, 0 otherwise.
farmer: dummy variable which takes value 1 if the household is a farmer, 0 otherwise.
self-employed: dummy variable which takes value 1 if the household is self employed, 0 otherwise.
abit: dummy variable, takes value 1 if the household own a house, 0 otherwise.
anniban: length of the relationship with the bank (years)
carcre: dummy variable, takes value 1 if the household owns at least 1 credit card.
dassan: dummy taking value 1 if the household owns health insurance.
dassvita: dummy taking value 1 if the household owns life insurance.
dassdanni: dummy taking value 1 if the household owns property insurance.
insurance: dummy taking value 1 if the household owns property insurance or health insurance.

Definition of assets

The SHIW provides detailed information about real and financial assets and financial liabilities. In particular, in the SHIW we can identify:
AF total financial assets
PF total financial liabilities
AR real assets

Among real assets, we can distinguish between:
AR1 real estate
AR2 business
AR3 other valuable assets

The SHIW provides detailed information about ownership and amount of wealth detained in the following classes of financial assets.

(1) CONTAN cash
(2) LDBCC checking accounts
(3) LDBRI savings accounts
(4) LCD certificates of deposit
(5) LPCT reverse repurchase agreements
(6) LDP postal deposits
(7) LBFP postal bonds
(8) BOT short-term government bonds
(9) CCT long-term government bonds
(10) BTP long-term government bonds
(11) CTZ short-term government bonds
(12) LATS other government bonds
(13) LOBB corporate bonds
(14) LQFC investment funds
(15) LAZI equities
(16) LSRL shares in limited liabilities companies
(17) LPER shares in partnerships
(18)LGP investment funds
(19) LTE foreign bonds
(20) LCOOP co-op loans

I consider 2 definitions of risky assets.

a) **Broad definition**, includes: *BTP*,LSRL, LPER, LOBB, LAZI, LTE, *CCT, LATS*
b) **Narrow definition**, includes: LSRL, LPER, LOBB, LAZI, LTE

Portfolio-related variables can be defined as follows:

port_safe1, port_safe2: takes value if the household does not own any of the risky assets listed above (according to the broad and narrow definition, respectively)
share_narrow, **share_broad:** risky asset (according to the broad and narrow definition, respectively) over total financial assets.

(B) INDEX OF PORTFOLIO DIVERSIFICATION

In the empirical analysis, two different index of portfolio diversification have been used.

1) Inverse of the Herfindhal index

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

Depending on the number of assets included in the calculation, we can identify 3 indices of diversification:
div_index1: calculated including all financial assets;
div_index2: calculated including only risky assets (narrow definition)
div_index3: calculated including only risky assets (broad definition)

2) Number of assets detained in households' portfolio

Depending on the number of assets included in the calculation, we can identify 3 indices of diversification:
ndiv_index1: calculated including all financial assets;
ndiv_index2: calculated including only risky assets (narrow definition)
ndiv_index3: calculated including only risky assets (broad definition)

(C) PERMANENT INCOME

For the computation of permanent income I closely followed the methodology proposed by Guiso et al. (1992). They assume that permanent earnings of each household at time t can be expressed as:

$$Y_i^P(t) = Z_i\beta + \phi(\tau_i)$$

where Z is a vector of household and head of household characteristics and $\varphi(.)$ is a quadratic function of household's head age. Assuming that the maximum age at which people work is 65 years, and that the rate of productivity growth is equal to the interest rate, estimated permanent earnings at age/time τ_0 is given by:

$$Y_i^P(\tau_0) = Z_i b + (65 - \tau_{0i} + 1)^{-1} \sum_{\tau i=\tau_{0i}}^{65} f(\tau_i)$$

where b and f indicate, respectively, the estimated coefficients of β and φ

(D) INCOME VARIANCE

In order to calculate measures of earning variability, 6 waves of SHIW are considered (from 1991 to 2002). Unemployed households, and households whose earnings were less than 20% of the average over the period were excluded.
Following Guariglia (2001) three measures of earnings variability are calculated.
The first one ($\mathrm{var}1$) is obtained for each households by taking the square of the difference between detrended household earnings in 2002 and 1991, divided by 6 to have an annual rate.
The second one ($\mathrm{var}2$) is simply the variance of Y_t , over the 6 available waves. This measure considers all income shocks to be permanent.
Finally, the third measure of earning variability ($\mathrm{var}3$) is the variance of $(Y_t - Y_{t-1})$, calculated over waves 2 to 6. This measure considers all income shocks to be transitory.
Detrended household earnings (Y) is calculated by taking the residuals from a random-effect regression of household characteristics, such as age, age squared, educational and occupational dummies, and interaction terms between educational and occupational dummies with age and age squared.

(E) FIRST STAGE REGRESSION ESTIMATES

	(1) port_safe1	(2) port_safe2	(3) share_narrow	(4) share_broad	(5) dindex1	(6) ndindex1
ln (perm. income)	0.0316	0.0268	-0.0227**	-0.0223*	-0.0357***	-0.1293**
	(0.0206)	(0.0204)	(0.0114)	(0.0121)	(0.0082)	(0.0555)
income variance	-0.0114	-0.0226	0.0135	0.0107	0.0088	0.1366*
*1000	(0.0167)	(0.0167)	(0.0086)	(0.0106)	(0.0089)	(0.0731)
age	-0.0229*	-0.02014*	0.0134**	0.0180***	0.0040	0.0709**
	(0.0121)	(0.0115)	(0.0054)	(0.0063)	(0.0061)	(0.0320)
age^2	0.0002	0.0002	-0.0001**	-0.0001**	-0.00003	-0.0006**
	(0.0002)	(0.0001)	(0.00005)	(0.00006)	(0.00005)	(0.0003)
family size	-0.0189	-0.0324*	0.0121	0.0050	0.0197**	0.1068*
	(0.0193)	(0.0191)	(0.0106)	(0.0115)	(0.0097)	(0.0551)
n.income recip.>1	-0.0630	-0.0727*	0.0280	0.0276	-0.0316	-0.1861
(dummy)	(0.0411)	(0.0408)	(0.0245)	(0.0264)	(0.0212)	(0.1210)
farmer	0.2375	0.1401	-0.0670	-0.1255**	-0.2517***	-1.1748***
(dummy)	(0.1498)	(0.1549)	(0.0527)	(0.0593)	(0.0971)	(0.4387)
self employed	-0.0131	-0.0029	-0.0261	-0.0261	-0.0056	-0.0266
(dummy)	(0.0630)	(0.0645)	(0.0332)	(0.0348)	(0.0324)	(0.2150)
II wealth quartile	-0.1011	-0.1409**	0.0326	0.0202	0.0448	0.2868
	(0.0694)	(0.0640)	(0.0346)	(0.0401)	(0.0407)	(0.2131)
III wealth quartile	-0.2099***	-0.2125***	0.0448	0.0676	0.1363***	0.8508***
	(0.0771)	(0.0728)	(0.0383)	(0.0443)	(0.0449)	(0.2431)
IV wealth quartile	-0.3439	-0.3394***	0.1047**	0.1298***	0.1735***	1.1263***
	(0.0805)	(0.0769)	(0.0413)	(0.0469)	(0.0458)	(0.2420)
abit	0.0530	0.0493	0.0151	0.0039	-0.0358	-0.2352
(dummy)	(0.062)	(0.0617)	(0.0320)	(0.0360)	(0.0323)	(0.1793)
help from parents	-0.0720	-0.1320	0.0055	-0.0258	0.0354	0.1644
(dummy)	(0.1095)	(0.1121)	(0.0468)	(0.0490)	(0.0417)	(0.3679)
education	-0.0229***	-0.0168***	0.0083***	0.0144***	0.0045**	0.0273**
	(0.0047)	(0.0046)	(0.0025)	(0.0028)	(0.0023)	(0.0138)
risk averse	0.0946***	0.1070***	-0.0345*	-0.0256	-0.0512***	-0.3480***
(dummy)	(0.0359)	(0.0356)	(0.0197)	(0.0215)	(0.0177)	(0.1029)
anniban	-0.0476**	-0.0396***	0.0194**	0.0273**	0.0125	-0.0355
	(0.0193)	(0.0185)	(0.0098)	(0.0109)	(0.0106)	(0.0612)
Constant	1.8292***	1.7382	-0.3851**	-0.5984***	0.1602	0.5976
	(0.3452)	(0.3348)	(0.1570)	(0.1797)	(0.1759)	(0.9278)
Adj. R^2	0.1709	0.1451	0.1341	0.2162	0.1472	0.2006

Notes: this table shows IV first - stage regression results for dicotomic variables of risky asset ownership (*port_safe1* and *port_safe2*), share of risky asset over total financial wealth (*share_narrow* and *share_broad*) and indexes of portfolio diversification (*dindex1* and *ndindex1*).

(F) IV ESTIMATION USING ALTERNATIVE INSTRUMENTS				
	(1)	**(2)**	**(3)**	**(4)**
port_safe1	-1.461*		-1.314**	
	(0.795)		(0.617)	
port_safe2		-1.598*		-1.503**
		(0.882)		(0.666)
ln (permanent income)	-0.771***	-0.768***	-1.023***	-0.994***
	(0.126)	(0.127)	(0.157)	(0.162)
income variance*1000	0.0201	0.0127	-0.0151	-0.0322
	(0.0759)	(0.0813)	(0.0940)	(0.0964)
age	0.0428	0.0424	0.104**	0.110***
	(0.0329)	(0.0327)	(0.0411)	(0.0411)
age^2	-0.000417	-0.000406	-0.000930**	-0.000982**
	(0.000305)	(0.000304)	(0.000381)	(0.000382)
family size	0.0744	0.0641	0.163**	0.127
	(0.0530)	(0.0541)	(0.0740)	(0.0789)
n. income recipients>1	0.0781	0.0923	-0.110	-0.123
	(0.141)	(0.141)	(0.166)	(0.173)
farmer (dummy)	0.0891	0.102	0.876	0.841
	(0.344)	(0.349)	(0.725)	(0.717)
self employed (dummy)	-0.0586	-0.0668	-0.202	-0.176
	(0.147)	(0.147)	(0.208)	(0.213)
II wealth quartile	-0.0859	-0.118	0.269	0.215
	(0.200)	(0.210)	(0.300)	(0.310)
III wealth quartile	0.0577	0.0371	0.0861	0.0748
	(0.277)	(0.286)	(0.366)	(0.367)
IV wealth quartile	0.0506	0.0288	0.262	0.233
	(0.375)	(0.388)	(0.442)	(0.442)
n. credit card>1	-0.0959	-0.0596		
	(0.186)	(0.170)		
real wealth var.>0	-0.354	0.592		
(dummy)	(0.483)	(0.395)		
fin. Wealth var>0	0.374	-0.0248		
	(0.364)	(0.176)		
owns house	0.210	0.233	0.180	0.202
(dummy)	(0.169)	(0.174)	(0.259)	(0.264)
help friends/relatives	-0.674**	-0.702**	-0.484	-0.571
	(0.299)	(0.312)	(0.536)	(0.570)
Constant	2.684**	2.876**	0.975	1.015
	(1.135)	(1.223)	(1.380)	(1.381)
Observations	1,324	1,324	496	496
R-squared	0.159	0.148	0.154	0.097

Notes: this table shows IV regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). In specification (1) and (2) **port safe1** and **port_safe2** are instrumented using the length of relationship with a bank and a dummy which takes value 1 if the household head reports having used forms of remote connections with a bank or a financial institution. In specification (3) and (4) risk aversion is also used as additional instrument. Each regression is weighted using SHIW sampling weights.

TABLE 1 Descriptive statistics-main variables (all sample)

	mean	s.d.	median
precaut	44345.8	79381.55	20000
precaut/permanent income	4.164	64.530	1.814
precaut/labor income	4.071	45.564	1.190
age	54.972	16.118	54
years of education	8.740	4.662	8
wealth	177598.7	307368.9	102500
real assets	158707	274698.7	100000
financial assets	23092.36	86840.2	6500
labor income	15221.33	18296.62	12600

Notes: sample statistics are estimated using SHIW population weights.

TABLE 2 Desired precautionary saving-descriptive statistics (average values)

	PRECAUT.	*PRECAUT/ YP*
age class		
< 30	35212.14	5.288539
31 - 40	51221.94	10.07616
41 - 50	52002.71	3.712609
51 - 65	49883.18	2.24675
>65	30855.11	3.861782
North	53575.33	4.048967
Centre	54120.9	5.126186
South	25725.69	3.754108
Married	49580.19	5.178626
Single	34209.43	2.200459
Education		
Primary School	28750.46	2.020019
High School	50406.17	5.623866
Undergraduate or more	73129.48	3.584275
Job status		
unemployed	36793.82	4.44081
self - employed	64039.20	4.723714
dependent job	48484.04	4.723714
1^wealth quartile	32982.82	5.760568
2^wealth quartile	30483.16	2.719051
3^wealth quartile	46915.17	2.746094
4^wealth quartile	75222.63	5.625952
Risk averse	50021.99	2.754
Risk lover-neutral	67523.17	5.068
Liquidity constraints (1^def)		
constrained	35937.74	5.061201
unconstrained	53088.85	5.287624
Liquidity constraints (2^def)		
constrained	31978.05	7.6921119
unconstrained	45863.57	3.731517
Home ownership		
own home	46653	3.267529
do not own home	39334.48	6.11254
Portfolio composition - narrow def.		
only safe assets	39838.71	3.980443
risky asset ownership	83716.58	6.130957
Risky asset ownership - broad def		
only safe assets	81558.29	5.963333
risky asset ownership	39279.32	3.964644
whole sample	44345.8	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.

TABLE 3 Diversification Index - descriptive statistics

	mean	min	max	n. 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: $\text{div}\_index1, \text{div}\_index2, \text{div}\_index3$ are index of portfolio diversification, calculated as the inverse of the Herfindhal index, whereas $n\,\text{div}\_index1, n\,\text{div}\_index2, n\,\text{div}\_index3$ are calculated as the number of asset the household hold in his portfolio. Subscript 1, 2, 3, refer to the cathegory of asset used to calculate the index: all asset (1), risky asset in a narrow sense (2) and risky asset in a broad sense (3). Sample statistics are calculated using SHIW population weights.

TABLE 4.1 Number of assets (*ndindex1*)

NUMBER OF ASSET IN THE PORTFOLIO	frequency	
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	0.4%
8	18	0.27%
9	4	0.06%
10	3	0.05%
11	1	0.02%
TOT	6548	

Notes: sample statistics are estimated using SHIW population weights.

TABLE 4.2 Number of assets (*ndindex2*)

NUMBER OF ASSET IN THE PORTFOLIO	frequency	
1	1030	65.15%
2	381	24.10%
3	130	8.22%
4	34	2.15%
5	5	0.32%
6	1	0.06%
TOT	1581	

Notes: sample statistics are estimated using SHIW population weights.

TABLE 4.3 Number of assets (*ndindex3*)

NUMBER OF ASSET IN THE PORTFOLIO	frequency	
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%
TOT	2778	

Notes: sample statistics are estimated using SHIW population weights.

TABLE 5.1 OLS ESTIMATION USING PORT_SAFE1
Dependent variable: ln(precaut_y)

	(1)	(2)	(3)	(4)	(5)
ln(permanent income)	-0.931***	-1.019***	-0.764***	-0.865***	-0.962***
	(0.120)	(0.139)	(0.124)	(0.189)	(0.0316)
port_safe1	-0.322***	-0.249**	-0.415***	-0.251***	-0.257***
	(0.0922)	(0.117)	(0.0944)	(0.0901)	(0.0545)
income variance*1000	0.0651	0.0694	0.0808*	0.0643*	-0.00693
	(0.0415)	(0.0492)	(0.0443)	(0.0358)	(0.0366)
age	0.0348	0.108***	0.0377	0.0557	0.0467***
	(0.0224)	(0.0335)	(0.0233)	(0.0365)	(0.0141)
age^2	-0.000334*	-0.00105***	-0.000375*	-0.000534	-0.000432***
	(0.000199)	(0.000316)	(0.000207)	(0.000375)	(0.000124)
primary school (dummy)	-0.274**	-0.116	-0.224*	-0.0372	-0.218***
	(0.117)	(0.156)	(0.123)	(0.146)	(0.0661)
upper primary school	-0.0902	-0.127	-0.0103	-0.0112	-0.0635
(dummy)	(0.0919)	(0.141)	(0.0984)	(0.0963)	(0.0594)
Undergraduate	0.174	0.0392	0.129	0.143	0.243***
(dummy)	(0.115)	(0.168)	(0.123)	(0.109)	(0.0754)
Graduate education	-0.105	-0.0734	-0.139	-0.470	-0.0555
(dummy)	(0.462)	(0.572)	(0.422)	(0.430)	(0.315)
n.income recip>1	-0.0790	0.0341	-0.0362	-0.138	-0.0837
(dummy)	(0.100)	(0.130)	(0.104)	(0.102)	(0.0548)
farmer	-0.0792	-0.0580	-0.277	-0.145	-0.0708
(dummy)	(0.186)	(0.294)	(0.216)	(0.176)	(0.151)
self employed	0.141	0.159	0.0464	0.0613	0.0853
(dummy)	(0.0997)	(0.155)	(0.108)	(0.0870)	(0.0743)
family size	0.0813**	0.0725	0.0101	0.0938**	0.0773***
	(0.0406)	(0.0585)	(0.0413)	(0.0446)	(0.0247)
II wealth quartile	0.483***	0.419*	0.553***	0.424***	0.416***
	(0.136)	(0.250)	(0.149)	(0.142)	(0.0874)
III wealth quartile	0.633***	0.487*	0.720***	0.163	0.566***
	(0.156)	(0.262)	(0.168)	(0.165)	(0.0970)
IV wealth quartile	0.811***	0.741***	0.929***	0.470***	0.714***
	(0.170)	(0.280)	(0.182)	(0.173)	(0.102)
owns house	-0.246**	-0.00587	-0.345***	-0.0892	-0.152*
	(0.124)	(0.225)	(0.133)	(0.124)	(0.0777)
help from relatives	0.217	0.304	0.163	-0.0162	0.0471
	(0.293)	(0.339)	(0.340)	(0.239)	(0.149)
credit card>1	0.126	0.239**	0.172**	0.167**	
	(0.0821)	(0.121)	(0.0849)	(0.0791)	
real wealth variation>0	0.761	-0.259	0.349	-0.144	
	(0.661)	(0.264)	(0.564)	(0.650)	
financial wealth variation>0	-0.642	0.338*	-1.095**	0.477*	
	(0.506)	(0.180)	(0.539)	(0.253)	
bank counters			5.052*		
			(2.733)		

bank counters*			4.199***		
20,000< inhab.<40,000			(1.437)		
bank counters*			0.600		
40,000< inhab.<500,000			(1.459)		
bank counters*			-5.626**		
inhab.>500,000			(2.492)		
risk averse		0.0552			
(dummy)		(0.106)			
n. days ill				-0.00184	
				(0.00178)	
year=2004					0.348***
					(0.0533)
Constant	1.953***	0.260	1.171*	1.135	1.728***
	(0.669)	(0.884)	(0.695)	(0.836)	(0.408)
Observations	2,984	1,006	2,984	1,369	4,500
R-squared	0.204	0.258	0.116	0.168	
	Robust standard errors in parentheses				
	***** p<0.01, ** p<0.05, * p<0.1**				

Notes: this table shows OLS regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). Households' portfolio composition is proxied using **port_safe1,** a dummy which takes value 1 if the household does not own any risky asset (in a broad definition). In specification (2) a dummy which takes value 1 if the household is risk averse is included in the estimation. In specification (3) the number of bank counters per person, interacted with 4 town size dummies are included instead of 21 regional dummies. In specification (4) only working households' heads are considered and a variable indicating the number of days the household head was ill during the period is introduced. Finally, in specification (5) panel random-effect estimation is performed, using 2002 and 2004 waves of SHIW. Each regression is weighted using SHIW sampling weights.

TABLE 5.2 OLS ESTIMATION USING PORT_SAFE2
Dependent variable: ln(precaut_y)

	(1)	(2)	(3)	(4)	(5)
ln(permanent income)	-0.933***	-1.018***	-0.766***	-0.878***	-0.961***
	(0.120)	(0.140)	(0.124)	(0.189)	(0.0316)
port_safe1	-0.307***	-0.279**	-0.411***	-0.305***	-0.291***
	(0.0935)	(0.121)	(0.0967)	(0.0900)	(0.0552)
income variance*1000	0.0639	0.0675	0.0790*	0.0620*	-0.00594
	(0.0418)	(0.0495)	(0.0445)	(0.0360)	(0.0363)
age	0.0359	0.110***	0.0393*	0.0563	0.0473***
	(0.0223)	(0.0334)	(0.0233)	(0.0365)	(0.0141)
age^2	-0.000342*	-0.00107***	-0.000387*	-0.000536	-0.000437***
	(0.000199)	(0.000315)	(0.000207)	(0.000374)	(0.000124)
primary school (dummy)	-0.283**	-0.120	-0.234*	-0.0347	-0.216***
	(0.117)	(0.153)	(0.122)	(0.145)	(0.0660)
upper primary school	-0.0922	-0.125	-0.0113	-0.00652	-0.0606
(dummy)	(0.0915)	(0.139)	(0.0979)	(0.0957)	(0.0593)
Undergraduate	0.182	0.0458	0.138	0.152	0.245***
(dummy)	(0.116)	(0.169)	(0.123)	(0.109)	(0.0758)
Graduate education	-0.119	-0.0911	-0.157	-0.491	-0.0585
(dummy)	(0.459)	(0.574)	(0.418)	(0.428)	(0.318)
n.income recip>1	-0.0782	0.0371	-0.0348	-0.141	-0.0827
(dummy)	(0.100)	(0.130)	(0.104)	(0.102)	(0.0549)
farmer	-0.0818	-0.0548	-0.279	-0.149	-0.0730
(dummy)	(0.186)	(0.293)	(0.216)	(0.176)	(0.151)
self employed	0.137	0.154	0.0393	0.0606	0.0821
(dummy)	(0.0997)	(0.155)	(0.108)	(0.0868)	(0.0742)
family size	0.0803**	0.0686	0.00836	0.0932**	0.0756***
	(0.0406)	(0.0586)	(0.0413)	(0.0444)	(0.0247)
II wealth quartile	0.484***	0.415*	0.552***	0.421***	0.413***
	(0.136)	(0.251)	(0.149)	(0.142)	(0.0874)
III wealth quartile	0.638***	0.487*	0.723***	0.158	0.565***
	(0.156)	(0.264)	(0.169)	(0.165)	(0.0970)
IV wealth quartile	0.823***	0.738***	0.940***	0.462***	0.713***
	(0.170)	(0.280)	(0.182)	(0.173)	(0.102)
owns house	-0.243*	-0.000632	-0.341**	-0.0818	-0.149*
	(0.124)	(0.225)	(0.133)	(0.124)	(0.0777)
help from relatives	0.221	0.315	0.171	-0.00690	0.0498
	(0.293)	(0.341)	(0.340)	(0.242)	(0.150)
credit card>1	0.131	0.235*	0.178**	0.165**	
	(0.0826)	(0.123)	(0.0852)	(0.0794)	
real wealth variation>0	0.812	-0.253	0.417	-0.0761	
	(0.639)	(0.263)	(0.554)	(0.654)	

financial wealth variation>0	-0.670	0.324*	-1.132**	0.450*	
	(0.502)	(0.179)	(0.544)	(0.263)	
bank counters			5.142*		
			(2.741)		
bank counters* 20,000< inhab.<40,000			4.224***		
			(1.441)		
bank counters* 40,000< inhab.<500,000			0.584		
			(1.461)		
bank counters* inhab.>500,000			-5.764**		
			(2.494)		
risk averse (dummy)		0.0545			
		(0.107)			
n. days ill				-0.00193	
				(0.00178)	
year=2004					0.351***
					(0.0532)
Constant	1.919***	0.235	1.127	1.207	1.746***
	(0.665)	(0.866)	(0.689)	(0.830)	(0.406)
Observations	2,984	1,006	2,984	1,369	4,500
R-squared	0.203	0.260	0.115	0.170	
Number of observations					2,999
Robust standard errors in parentheses ***** p<0.01, ** p<0.05, * p<0.1**					

Notes: this table shows OLS regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). Households' portfolio composition is proxied using **port_safe2,** a dummy which takes value 1 if the household does not own any risky asset (in a broad definition). In specification (2) a dummy which takes value 1 if the household is risk averse is included in the estimation. In specification (3) the number of bank counters per person, interacted with 4 town size dummies are included instead of 21 regional dummies. In specification (4) only working households' heads are considered and a variable indicating the number of days the household head was ill during the period is introduced. Finally, in specification (5) panel random-effect estimation is performed, using 2002 and 2004 waves of SHIW. Each regression is weighted using SHIW sampling weights.

TABLE 6.1 IV ESTIMATION
Dependent variable: ln(precaut_y)

	(1)	**(2)**
port_safe1	**-1.888***** **(0.635)**	
port_safe2		**-2.036***** **(0.694)**
permanent income	-0.785*** (0.129)	-0.781*** (0.130)
Income variance*1000	0.000429 (0.0735)	-0.00781 (0.0790)
age	0.0442 (0.0335)	0.0437 (0.0334)
age^2	-0.000427 (0.000311)	-0.000413 (0.000310)
family size	0.0724 (0.0537)	0.0594 (0.0543)
n. income recip>1 (dummy)	0.0731 (0.144)	0.0915 (0.145)
farmer (dummy)	0.142 (0.343)	0.155 (0.348)
self employed (dummy)	-0.0387 (0.153)	-0.0503 (0.154)
II wealth quartile	-0.150 (0.199)	-0.186 (0.206)
III wealth quartile	-0.0499 (0.261)	-0.0691 (0.264)
IV wealth quartile	-0.124 (0.352)	-0.141 (0.360)
carcre (dummy)	-0.163 (0.165)	-0.113 (0.153)
real wealth variation>0 (dummy)	-0.458 (0.580)	0.754** (0.353)
financial wealth variation>0 (dummy)	0.469 (0.415)	-0.0443 (0.192)
abit (dummy)	0.243 (0.167)	0.271 (0.170)

help from parents/friends	-0.743*** (0.284)	-0.775*** (0.296)
Constant	3.086*** (1.080)	3.305*** (1.139)
Instruments: years of education, lenght 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
Robust standard errors in parentheses ***** p < 0.01, ** p < 0.05, * p < 0.1**		

Notes: this table shows IV regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional 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. Each regression is weighted using SHIW sampling weights.

TABLE 6.2 IV ESTIMATION- PANEL
Dependent variable: ln(precaut_y)

	(1)	(2)
port_safe1	**-1.602*** **	
	(0.438)	
port_safe2		**-1.845*** **
		(0.515)
ln (permanent income)	-0.977***	-0.968***
	(0.0487)	(0.0491)
income variance *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)
n. income recipients>1 (dummy)	-0.00374	-0.00756
	(0.0775)	(0.0791)
farmer (dummy)	-0.221	-0.251
	(0.270)	(0.275)
self employed (dummy)	-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)
abit (dummy)	0.102	0.119
	(0.125)	(0.129)
help from parents/friends (dummy)	-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

Standard errors in parentheses

***** p < 0.01, ** p < 0.05, * p < 0.1**

Notes: this table shows random effect panel IV regression; 2002 and 2004 waves of SHIW are used. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. 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.

TABLE 6.3 IV REGRESSION USING ALTERNATIVE INSTRUMENTS

Dependent variable: ln(precaut_y)

	(1)	(2)
port_safe1	**-1.345*** **	
	(0.410)	
port_safe2		**-1.549*** **
		(0.500)
permanent income	-1.043***	-1.043***
	(0.0502)	(0.0522)
Income variance*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)
n. income recipients>0 (dummy)	-0.0600	-0.0858
	(0.120)	(0.128)
farmer (dummy)	0.673	0.579
	(0.555)	(0.558)
self employed (dummy)	-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)
abit (dummy)	0.361*	0.362*
	(0.206)	(0.204)
help from parents/friends	0.0423	-0.0609
	(0.326)	(0.347)
Constant	2.216**	2.539**
	(1.063)	(1.156)
Instruments: education, lenght 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

Robust standard errors in parentheses

***** p < 0.01, ** p < 0.05, * p < 0.1**

Notes: this table shows IV regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). **port safe1** and **port_safe2** are instrumented using household head's years of education, a dummy which takes value 1 if the household head reports being risk averse and the length of relationship with a bank. Each regression is weighted using SHIW sampling weights.

TABLE 7.1 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 (permanent income)	-0.852*** (0.135)	-0.824*** (0.140)	-0.817*** (0.131)	-0.731*** (0.132)
Income variance*1000	-0.00377 (0.102)	-0.0468 (0.115)	0.0345 (0.0937)	-0.0189 (0.115)
age	0.0267 (0.0358)	0.0266 (0.0370)	0.0636 (0.0419)	0.0194 (0.0375)
age^2	-0.000254 (0.000329)	-0.000228 (0.000339)	-0.000543 (0.000372)	-0.000175 (0.000345)
family size	0.0834 (0.0603)	0.0638 (0.0674)	0.0367 (0.0619)	0.0335 (0.0613)
n. income recipients>1 (dummy)	0.0534 (0.156)	0.0827 (0.166)	0.305* (0.160)	0.307* (0.167)
farmer (dummy)	0.209 (0.405)	0.261 (0.443)	0.500 (0.320)	0.323 (0.401)
self employed (dummy)	0.00293 (0.172)	-0.0613 (0.201)	0.0726 (0.175)	0.115 (0.184)
II wealth quartile	-0.0852 (0.211)	-0.140 (0.235)	0.123 (0.192)	0.0608 (0.198)
III wealth quartile	-0.00746 (0.260)	-0.0643 (0.281)	-0.145 (0.300)	-0.162 (0.338)
IV wealth quartile	-0.0723 (0.336)	-0.129 (0.378)	-0.231 (0.387)	-0.297 (0.448)
carcre	-0.111 (0.180)	-0.0743 (0.188)	-0.111 (0.181)	-0.0465 (0.174)
real wealth variation>0 (dummy)	-0.152 (0.509)	0.970** (0.472)	0.0183 (0.717)	0.115 (0.374)

financial wealth variation>0 (dummy)	0.481	0.0307	0.740	0.602*
	(0.350)	(0.237)	(0.570)	(0.351)
abit (dummy)	0.0950	0.119	0.137	0.209
	(0.179)	(0.197)	(0.170)	(0.183)
help from parents/friends	-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, lenght 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

Robust standard errors in parentheses

***** p < 0.01, ** p < 0.05, * p < 0.1**

Notes: this table shows IV regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). **share_broad** is the share of risky assets (defined in a broad sense) over financial wealth, whereas **share_narrow** is the share of risky assets (defined in a narrow sense) over financial wealth. **dindex1** and **ndindex1** represent indexes of financial diversification calculated respectively as the inverse of Herfindhal index and as the number of asset in household head's portfolio. s**hare_broad, share_narrow, dindex1** and **ndindex2** are instrumented using the length of the relationship with the bank and years of education. Each regression is weighted using SHIW sampling weights.

TABLE 7.2 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)**
permanent income	-1.028*** (0.0517)	-1.000*** (0.0624)	-0.938*** (0.0680)	-0.987*** (0.0595)
Income variance*1000	0.0196 (0.0660)	-0.00446 (0.0684)	0.00588 (0.0611)	-0.0617 (0.0719)
age	0.0473 (0.0341)	0.0423 (0.0378)	0.0735** (0.0346)	0.0433 (0.0349)
age^2	-0.000409 (0.000305)	-0.000349 (0.000342)	-0.000616** (0.000306)	-0.000332 (0.000312)
family size	0.122** (0.0542)	0.0912 (0.0612)	0.0581 (0.0694)	0.0585 (0.0660)
n. income recipients>1 (dummy)	-0.0372 (0.126)	-0.0694 (0.144)	0.156 (0.128)	0.153 (0.129)
farmer (dummy)	0.633 (0.539)	0.595 (0.549)	1.349* (0.765)	1.239* (0.674)
self employed (dummy)	-0.101 (0.185)	-0.0756 (0.198)	-0.151 (0.190)	-0.149 (0.199)
II wealth quartile	0.0824 (0.233)	0.0116 (0.254)	-0.0448 (0.248)	-0.0819 (0.245)
III wealth quartile	0.0905 (0.259)	0.0912 (0.270)	-0.268 (0.347)	-0.347 (0.347)
IV wealth quartile	0.190 (0.296)	0.128 (0.328)	-0.153 (0.401)	-0.289 (0.413)
abit (dummy)	0.303 (0.208)	0.256 (0.212)	0.439** (0.214)	0.478** (0.222)
help from parents/friends (dummy)	0.192 (0.287)	0.118 (0.315)	0.00962 (0.299)	0.0318 (0.343)

Constant	1.300	1.324	-0.418	-0.0606
	(0.927)	(1.006)	(1.028)	(0.961)
Instruments				
education, lenght 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

Robust standard errors in parentheses

***** p < 0.01, ** p < 0.05, * p < 0.1**

This table shows IV regression. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies, and 4 city size dummies (not reported for brevity). **share_broad** is the share of risky assets (defined in a broad sense) over financial wealth, whereas **share_narrow** is the share of risky assets (defined in a narrow sense) over financial wealth. **dindex1** and **ndindex1** represent indexes of financial diversification calculated respectively as the inverse of Herfindhal index and as the number of asset in household head's portfolio. s**hare_broad, share_narrow, dindex1** and **ndindex2** are instrumented using the length of the relationship with the bank, risk aversion and years of education. Each regression is weighted using SHIW sampling weights.

TABLE 8.1 IV ESTIMATION FORMAL AND INFORMAL INSURANCE SCHEMES
Dependent variable: ln(precaut_y)

	(1)	(2)
port_safe1	**-1.982*** **	
	(0.560)	
port_safe2		**-2.409*** **
		(0.734)
insurance	**-0.663**	**-0.800**
	(0.616)	(0.685)
ln (permanent income)	-1.077***	-1.045***
	(0.0792)	(0.0888)
income risk*1000	0.0365	0.00799
	(0.0509)	(0.0579)
age	0.0945**	0.0945**
	(0.0441)	(0.0466)
age^2	-0.000916**	-0.000880**
	(0.000406)	(0.000432)
family size	-0.0463	-0.0855
	(0.0744)	(0.0805)
n. income recipients>1	-0.102	-0.148
	(0.173)	(0.192)
farmer	0.836	1.014
	(0.736)	(0.799)
self employed	-0.0725	-0.143
	(0.221)	(0.242)
II wealth quartile	-0.151	-0.286
	(0.339)	(0.376)
III wealth quartile	-0.128	-0.276
	(0.389)	(0.431)
IV wealth quartile	-0.0611	-0.162
	(0.427)	(0.475)
Abit (dummy)	0.628**	0.706**
	(0.267)	(0.294)
help from parents/friends	0.217	0.103
	(0.510)	(0.589)
Constant	2.320*	2.753**
	(1.279)	(1.400)
Observations	868	868
R^2	0.201	0.108

Instruments:		
education, lenght of the relationship with the bank, risk aversion, bank counters/person		
Test of overidentifying restrictions		
	0.5926	0.6644
Robust standard errors in parentheses		
***** p < 0.01, ** p < 0.05, * p < 0.1**		

Notes. this table shows IV regression. The dummy *insurance* takes value 1 if the household head owns property or health insurance. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). Household head's years of education, risk aversion, the length of relationship with a bank and the number of bank counters per person are used as instruments for **insurance, port_safe1** and **port_safe2**. Each regression is weighted using SHIW sampling weights.

TABLE 8.2 IV ESTIMATION
FORMAL AND INFORMAL INSURANCE SCHEMES

Dependent variable: ln(precaut_y)

	(1)	(2)	(3)	(4)
share_broad	**5.241*** ** (1.721)			
share_narrow		**3.541*** ** (1.010)		
dindex1			**6.129*** (3.237)	
ndindex1				**0.903** ** (0.356)
insurance	**-0.948** (0.702)	**-0.722** (0.590)	**-1.015** (1.047)	**-0.731** (0.753)
ln (permanent income)	-1.013*** (0.0991)	-1.040*** (0.0811)	-0.811*** (0.184)	-0.884*** (0.122)
income risk*1000	-0.0279 (0.0666)	0.0144 (0.0531)	-0.0314 (0.0853)	-0.0893 (0.0787)
age	0.0583 (0.0494)	0.0591 (0.0444)	0.171** (0.0775)	0.107** (0.0499)
age^2	-0.000541 (0.000456)	-0.000585 (0.000404)	-0.00160** (0.000707)	-0.000976** (0.000452)
family size	-0.0460 (0.0860)	-0.0167 (0.0733)	-0.197 (0.141)	-0.148 (0.106)
n. income recip.>1	-0.108 (0.222)	-0.0586 (0.183)	0.275 (0.236)	0.228 (0.190)
farmer	0.812 (0.776)	0.512 (0.675)	2.090 (1.668)	1.569 (1.067)
self employed	0.0786 (0.263)	0.112 (0.224)	-0.0841 (0.263)	-0.0964 (0.227)
II wealth quartile	-0.176 (0.359)	-0.136 (0.319)	0.0593 (0.387)	-0.210 (0.331)
III wealth quartile	-0.0284 (0.401)	0.0126 (0.361)	-0.363 (0.539)	-0.539 (0.450)
IV wealth quartile	0.0431 (0.457)	0.111 (0.394)	-0.0573 (0.540)	-0.331 (0.487)
Abit (dummy)	0.467 (0.287)	0.463* (0.261)	0.504 (0.312)	0.685** (0.282)
help from parents/friends	0.283 (0.594)	0.442 (0.479)	0.181 (0.441)	0.612 (0.504)

Constant	1.219 (1.245)	1.265 (1.146)	-3.126 (2.591)	-1.835 (1.580)
Observations	862	862	862	862
R^2		0.144		0.048
Test of overidentifying restrictions:				
(p-value)	0.5571	0.3901	0.0602	0.0591

Robust standard errors in parentheses

***** p < 0.01, ** p < 0.05, * p < 0.1**

Notes. this table shows IV regression. The dummy *insurance* takes value 1 if the household head owns property or health insurance. The dependent variable is the logarithm of desired precautionary saving, scaled for permanent income. Each regression includes 21 regional dummies (not reported for brevity). Household head's years of education, risk aversion, the lenght of relationship with a bank and the number of bank counters per person are used as instruments for **insurance, share_broad , share_narrow, dindex1** and **ndindex1**. Each regression is weighted using SHIW sampling weights

CHAPTER 3

FINANCIAL DEVELOPMENT AND SELECTION INTO ENTREPRENEURSHIP: EVIDENCE FROM ITALY AND US*

Abstract

The existence of capital market imperfections causes business investment decisions to be strongly dependent on households' private wealth allocation. I claim that if a link exists between private wealth and business decisions, it should be stronger in countries with less developed capital markets. Here, I test this theoretical prediction assessing the relationship between initial household net wealth and the probability of switching to entrepreneurship in Italy and the United States, using household-level data from the Survey of Household Income and Wealth (SHIW) and the Panel Survey of Income Dynamics (PSID). Although Italy and the United States are both developed countries, there are striking differences between the two in terms of transaction costs, downpayment requirements and participation in financial markets. I formulated several theoretical predictions, which are then compared with the data at hand. First of all, I argue that initial wealth should matter more for potential Italian entrepreneurs, who may encounter greater difficulties than their US counterparts in obtaining sufficient funds from a bank or financial institution to start a business. From this perspective, "informal markets" (i.e. help from friends or relatives) should play a more significant role for potential entrepreneurs in Italy, especially for those who are more likely to be constrained. Secondly, I claim that a well developed financial market, by reducing household exposure to financial risk, would positively affect transition into entrepreneurship. Therefore, I fill a gap in the literature introducing a portfolio diversification index, calculated as the inverse of the Herfindhal index, in order to assess the level of financial sophistication. Last but not least, I simultaneously estimate the probability of switching to entrepreneurship and changes in net wealth. Using a sample selection model with endogenous switching makes it possible to deal with endogeneity issues, related to the fact that households may actually accumulate assets prior to setting up a business.

Keywords: entrepreneurship, business start up, financial development.
Jel classification: E21, L26, G20.

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1. Introduction.

Entrepreneurial activity, as well as a country's savings rate, plays a key role in economic growth. On the one hand, entrepreneurs create employment and wealth, fostering innovation. On the other, an increase in national savings has a substantial effect on the level of investment, which in turn affects growth[1].

From this perspective, it plainly emerges that capital market imperfections -such as transaction costs and borrowing constraints- are not neutral to growth. On the one hand, they affect business start ups by limiting the availability of funds to start a business (Evans and Jovanovic,1989; Banerjee and Newman,1993), while on the other, once the business is created, capital market imperfections may affect its size.

As Gentry and Hubbard (2004) point out, because of capital market imperfections (i.e. liquidity constraints and transaction costs) individual decisions concerning business start ups and subsequent investments cannot be disentangled from those regarding private wealth allocation. As a matter of fact, a better developed capital market would indeed weaken the link between entrepreneurial households' private saving choices and business decisions.

Here, I argue that if the linkage between households' occupational choices and private savings is in place, then it should be stronger for those living in a country where capital markets are less developed. In this regard, there are enormous differences between Italy and the US in terms of credit availability, households participation in the stock market and transaction costs (Kapteyin and Panis, 2003). These differences, which affect private savings, are likely to affect transition into entrepreneurship.

Actually, at the country-level, empirical evidence has shown that households' private net wealth strongly determines the probability of becoming an entrepreneur (Evans and Jovanovic, 1989; Evans and Leighton, 1989; Fairlie, 1999; Gentry and Hubbard, 2004)[2]. This result also holds when the issue of wealth endogeneity is taken into account, instrumenting wealth or using a more exogenous substitute directly in the estimation (Holtz, Eakin et al, 1994; Blanchflower and Oswald, 1998; Fairlie and Krashinsky, 2006). Actually, the positive and significant effect of private wealth in determining the probability of starting a business has been interpreted as proof in favor of the existence of capital market imperfections, in the form of liquidity constraints.

Here, the link between private wealth and business start ups is re-assessed using micro data from the Italian Survey of Household Income and Wealth (SHIW), and from the US Panel Survey of Income Dynamics (PSID). This comparison has been feasible because of shared measures and design features in the two datasets. Moreover, these data contain detailed information about households' demographic characteristics, occupation, wealth composition and attitudes toward risk. Finally, the panel structure of the data makes them particularly useful for keeping track of households' occupational choices and saving decisions over time.

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[1] See Parker (2005) for a survey of the main literature contributions assessing the entrepreneurship-growth link.

[2] Consensus is almost unanimous about this point (see Blanchflower and Oswald, 1998; Evans and Jovanovic 1993 among others). Only Hurst and Lusardi (2001) seem to disagree, arguing that other factors, such as attitudes towards risk affect business start ups.

Drawing on previous literature (Evans and Jovanovic, 1989; Evans and Leighton, 1989; Fairlie, 1999; Hurst and Lusardi, 2004) I will first describe institutional differences between the two countries, focusing on the way in which they are able to affect household occupational choices. Then, I formulate several theoretical predictions, which are next compared with the data at hand. The more these predictions are corroborated by the microdata, the more confident we can be that inter-country institutional differences help to explain households' selection into entrepreneurship.

First of all, I claim that lower transaction costs and lower downpayment requirements should make obtaining a loan easier for potential US entrepreneurs. Consequently, the net wealth of Italian households before switching to entrepreneurship should matter more. Moreover, in Italy informal markets (i.e. help from relatives and friends) are more likely to offset capital market rigidities (Guiso and Jappelli, 1991).

Secondly, given a better developed financial market, US households should participate to a greater extent in financial markets[3]. From this perspective, if we assume imperfect correlation between asset returns, we can argue that US households have more opportunities to insure themselves against financial risk. Introducing a portfolio diversification index into the estimation of the probability of starting up a business helps to proxy for financial sophistication, which may affect household wealth allocation and in turn household occupational choices.

Finally, I argue that wealth accumulation, rather than the initial level of wealth, may represent a more powerful instrument for explaining household occupational choices. Actually, households may accumulate assets before starting a business. This should be true especially in Italy. On the one hand, imperfections in capital markets may discourage potential entrepreneurs from asking a bank or a financial institution for a loan. On the other hand, Italian households may accumulate assets in advance so as to be able to pay higher downpayments. Some studies have already addressed changes in wealth both theoretically (Buera, 2003) and empirically (Hurst and Lusardi, 2004). However, capital accumulation is endogenous to household decisions to switch to entrepreneurship. To cope with endogeneity, I simultaneously estimate the process of capital accumulation and the decision to switch to entrepreneurship using an endogenous switching regression approach.

Empirical evidence strongly supports theoretical predictions formulated on the basis of institutional differences between Italy and the US. The marginal effect of the initial level of household wealth is greater and more significant for Italian households than US ones. Moreover, expected liquidity constraints are found to negatively affect households occupational choices.

From this perspective, because of more severe imperfections in Italian credit markets, "informal networks" are more likely to offset credit market rigidities. This holds especially for those business which does not probably require an high level of start-up capital. When a non-negligible investment is required we found instead binding liquidity constraints to represent a strong obstacle to business start ups. Besides the credit market, a higher level of financial sophistication positively affects US household occupational choices. The availability of more financial instruments, helping US households to better deal with uninsurable risks, weakens the link

[3] See Guiso and Jappelli (2002) and Bertaut-Star McCluer (2002) for an empirical analysis of financial market participation of Italian and US households, and Guiso, Haliassos and Jappelli (2003) as far as a comparative analysis regarding stockholding is concerned.

between household wealth and investment decisions. Finally, asset accumulation is found to be an important device for business start ups, especially in a country- like Italy- where credit market imperfections are more severe.
This paper contributes to the existing literature in three ways. First of all, by creating a bridge between the finance-growth and occupational choices literature. Showing that in a country with a better developed financial market business start ups are enhanced, weakening the link between personal wealth and occupational choices, is a proof in favor of Deaton's view, according to which private savings- especially entrepreneurial saving- are not neutral to growth. In this regard, my analysis differs from studies analyzing business formation that take cross country aggregate data[4] into account, which do not allow for the impact of public policies on individual saving behavior. My claim is instead that public policies affect business formation through incentives to saving behavior. In this regard, household-specific data should be used instead of aggregate data.
Secondly, this paper contributes to the literature on entrepreneurial choice and wealth in several ways. First of all, I analyze in more depth the extent to which Italian and US households rely on "informal" markets to overcome financial market deficiencies. Then, I use a portfolio diversification index as a proxy of financial market development. Portfolio diversification is indeed one means of dealing with financial risk. Controlling for individual attitudes to risk, I argue that the greater a household's opportunities to diversify its asset portfolio, the more efficient the composition of savings will be and therefore the greater the possibility of switching to entrepreneurship. Last but not least, I will emphasize to what extent the process of capital accumulation affects the way households switch to entrepreneurship.
The paper is structured as follows. In the second section, a brief review of existing literature about wealth and occupational choices is provided. Then, some of the main differences between Italian and US capital markets are described in section 3. In particular, on the basis of institutional differences between these two countries I will formulate some predictions which will be tested in subsequent sections. In section 4, the data used in the empirical analysis are described, providing some comparative evidence of demographic and financial characteristics of Italians and US shifting towards entrepreneurship. Section 5 contains the estimation aimed at shedding light on the link between the initial net wealth of a household and the probability of starting up a business. Section 6 analyzes instead the relation between business start ups and changes in wealth. Section 7 concludes with some final remarks.

2. Brief literature review

The debate on the relationship between wealth and occupational choice is a longstanding one. Shumpeter and Knight made path-breaking contributions in this field at the beginning of the last century. Whereas Shumpeter separates the entrepreneurial role from the capitalist one, according to Knight the entrepreneur also needs to be a capitalist. The high uncertainty correlated with entrepreneurial activity makes it impossible for the market to provide the entrepreneur with all the capital he requires. Therefore, in the Knightian view initial wealth is not neutral to business start ups.

[4]See, for example, Rajan and Zingales (2003) and Klapper, Laeven and Rajan (2004) among others.

From an empirical perspective, several contributions have attempted to shed light on the relationship between wealth and business start ups. Evans and Jovanovic (1989) argue that capital market imperfections in the form of borrowing constraints select wealthy households into entrepreneurship. Wealthy households are indeed less likely to face binding liquidity constraints, since they may be able to meet higher collateral requirements when asking for a loan or be more likely to have sufficient capital of their own to set up an entrepreneurial activity. Using data from the National Longitudinal Survey of Young Men (NLS) for 1966-81, they eventually found a positive and strong relation between entrepreneurial entry and initial assets especially when liquidity constraints are in place.

Similar to Evans-Jovanovic are the contributions by Evans and Leighton (1989) who use the National longitudinal survey (NLS) for 1966-81 and the Current Population Survey (CPS) for 1968-87 and by Gentry and Hubbard (2004) who use instead the Survey of Consumer Finance for the years 1984 and 1989.

As far as cross country - comparative studies are concerned, Klapper, Laeven and Rajan (2004) found, using aggregate-level data, that a country's business environment strongly affects the creation of new firms. In particular, they provide evidence that the entry rate for industries that depend heavily on external finance is higher in countries with better developed financial systems. Their findings confirm Evans and Jovanovic's thesis: the supply of credit is an important aid to entrepreneurship.

Cagetti and De Nardi (2000) study the choice of starting an entrepreneurial activity through a simulation analysis calibrated on US data (PSID and SCF). They identify two main forces that affect the probability of becoming an entrepreneur: wealth and risk aversion. However, they consider intergenerational transfers as the only forces that may lead people towards entrepreneurship. Moreover, they do not consider the fact that people may become entrepreneurs after switching from another job.

Using data from the SCF, Cagetti and De Nardi (2006) found that a strong relationship exists between asset ownership and external financing, and between wealth and entrepreneurial entry. They develop a model of wealth accumulation and bequests in which entrepreneurs face an endogenous borrowing constraint that limits the amount they can borrow. They find this setup generates a wealth distribution that matches the one observed in the data.

Quadrini (2000) develops a general equilibrium model to explain the high level of income inequality to be found in US data. Asset holdings, together with the perceived ability of successfully carrying on a business, drive the choice of starting an entrepreneurial activity. Modeling explicitly entrepreneurial choice, Quadrini took into consideration the fact that entrepreneurs' saving patterns differ strongly from those of non-entrepreneurs'. First of all, they need to save in order to accumulate the minimum capital requirement to set up an entrepreneurial activity or to implement larger projects. Secondly, enterprising households usually face a higher uninsurable risk, that may result in higher precautionary saving. He uses PSID data (1984-1989 panel component) to calculate net wealth transition matrices for workers and entrepreneurs and found that entrepreneurs are more likely to pass into the upper wealth groups, whereas the trend is reversed for workers.

Using data from the Italian Survey of Household Income and Wealth, Magri (2009) found that the initial net wealth of a household is important for explaining the decision to become an entrepreneur, but that it does not affect the size of the business once it has been created.

Caner (2003), analyses in depth entrepreneurs savings using PSID data. She found that not only

do entrepreneurs have higher incomes, but they also have greater wealth accumulation and higher wealth-to-income ratios. Moreover, she addresses more effectively the problem of the endogeneity of saving rate with respect to business ownership, estimating simultaneously household saving rate and their occupational choice.
Gentry and Hubbard (2004) analyze the wealth-entrepreneurship channel in greater depth. They argue that capital market imperfections in the form of borrowing constraints affect a household's probability of becoming entrepreneurs and starting up firms, since they strongly influence both the amount and composition of household savings. They point out that because of capital market imperfections, firm decisions cannot be disentangled from household decisions. In this context, financial development plays a dual role. First of all, it may facilitate capital access for potential entrepreneurs starting up a business. This should be true especially for small businesses that usually face more severe financial constraints and are less able to diversify and insure risks. Consequently, it may help to weaken the link between household savings and firms' decisions Secondly, financial development may strongly influence the amount and composition of household savings. In turn, this affects not only the probability of the household head starting an entrepreneurial activity, but also that of the other household members through the channel of bequest, gifts and intergenerational transfers.

3. Institutional differences between Italy and US.

Italy and the US differ significantly as far as credit market development and financial market participation are concerned. Here, I discuss some of the institutional differences between Italy and the US which are pertinent to the present analysis. In particular, I will underline the extent to which the institutional background of a country is able to exert a strong impact on household occupational choices. Because of capital market imperfections, investment and savings choices are indeed strongly correlated (Gentry and Hubbard, 2004). Therefore, a country's level of development may affect the probability of starting up a business not only through direct incentives for entrepreneurial investment, but also through private savings incentives.
The first main difference between Italy and the US concerns the credit market, in particular the mortgage market and transaction costs (Kapteyin and Panis, 2003; Bianco, Jappelli and Pagano, 2004; Chiuri and Jappelli 2003).
As far as mortgage markets are concerned, substantial differences exist between Italy and the US, particularly in regard to downpayment requirements. In the US the average level of downpayment requirements is around 10-20%, whereas in Italy they may be as much as 40-50% of the total value of the real estate. Moreover, in the event of default foreclosures take much longer and transaction costs are much higher in Italy than in the US (OECD 2004).
In addition to transaction costs and downpayment requirements, judicial enforcement is a strong candidate for explaining differences in the loan market between Italy and the United States. Actually, the cost of lending and the loan supply are strongly affected by the cost of recovery from insolvent borrowers. Djankov, La Porta and Lopez-de-Silanes (2003) and Bianco, Jappelli and Pagano (2004) highlight the enormous differences in terms of judicial efficiency between these two countries[5]. Magri (2009) instead, incorporates judicial enforcement into a theoretical model.

[5]Djankov, La Porta and Lopez-de-Silanes (2003) report the duration of dispute resolution for two court cases: collecting a bounced check and evicting a delinquent tenant, for 109 countries. Actually, they report that in Italy the

Using data on judicial enforcement in Italy, she shows that net wealth matters more for those entrant entrepreneurs living in regions with less stringent judicial enforcement[6].
The existence of strong rigidities in the Italian financial market results in an extremely low percentage of the total population applying for credit. Clearly these differences are not neutral to business formation. A broad strand of literature has pointed out the importance of initial assets to business start ups (Evans and Jovanovic, 1989; Evans and Leighton 1989; Gentry and Hubbard 2004). Initial net wealth is indeed not only important *per se*, but also because it may be used to meet collateral requirements in the event the potential entrepreneur needs additional funds. Actually, one of the main findings of Evans-Jovanovic's path breaking contribution is that initial assets matter especially for those households who are liquidity constrained.
My claim is that differences between Italy and US regarding credit market affect business start ups in two directions. First of all, high transaction costs and downpayment requirements may discourage Italian households from asking for a loan. In this context, the initial wealth of a household should matter more for potential Italian entrepreneurs, than for their US counterparts. Moreover, in Italy those households which decide to apply for a loan in credit markets may have to accumulate assets in order to meet high downpayment requirements.
Different Italian and US credit market development levels may result in parental support playing a different role in the two countries. Actually, as Evans-Jovanovic (1989) point out, parental support is a channel through which potential entrepreneurs may raise enough funds to start a business[7] Moreover, Guiso and Jappelli (1991), analyzing a cross section of Italian households, found that intergenerational transfers help to relax binding borrowing constraints[8]. I claim that the role played by this "informal" market is stronger and more significant for Italian than for US households in the switch to entrepreneurship. Because of the lower confidence in capital markets, Italian households rely more on "informal markets". Thus, help from friends and relatives is important especially for those households that are more likely to be constrained. Actually, informal networks could act as a substitute for credit markets - so those households whose loan application is rejected may ask for support from parents and friends. However, such informal networks may complement traditional markets. In this sense, support from parents may help to meet downpayment requirements. From a cross country perspective, it is interesting to analyze to what extent interactions between "traditional" credit markets and "informal networks" affect transition into entrepreneurship.
Beside of credit market features, Italy and US 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 towards risk, but also on supply-side features,

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average duration of dispute resolution is 645 days versus 49 days in the US.
[6]As well as judicial enforcement, difference in bankruptcy regulations provide a plausible explanation for differences in the percentage of loan applicants between the two countries As Crook (2005) pointed out, in Italy we observe a greater demand for debt in regions with a more efficient judicial system. On the contrary, in the US greater protection in the event of bankruptcy increases the demand for debt for those in the upper half of the wealth distribution.
[7]In this regard, Basu and Parker (2001) model household altruism in a theoretical framework using a unique dataset of Asian entrepreneurs in the UK.
[8]However, their findings show that even after receiving a transfer, Italian households are still constrained.

such as the availability of financial instruments and transaction costs. Empirical works highlighted substantial differences in this sense between Italy and the US (Guiso and Jappelli, 2002; Bertaut and Star McCluer, 2000). Italian households are found to hold a lower percentage of stocks, compared to their US counterparts, and a less diversified portfolio[9].

As pointed out by Gentry-Hubbard (2004), imperfections in credit markets make decisions about personal savings interdependent on investment decisions. Moreover, uncertainty and uninsurable risks mean that portfolio and saving decisions are strongly interrelated, since potential uninsurable risks (unemployment, health, financial risk), encourage people to save more for precautionary reasons. In this regard, it has been shown (Guiso, Jappelli and Terlizzese, 1992) that uncertainty leads households to opt for a relatively safe portfolio. As uncertainty increases, households want to reduce other risks, such as financial risk, so they try to avoid holding risky assets. Kennikell and Lusardi (2004), and Jappelli and Pistaferri (2008), using a direct measurement of precautionary wealth (in SCF and SHIW, respectively), found the desired precautionary savings-to-permanent income ratio to be higher in Italy than in the US.

Taking into consideration financial markets, clearly better opportunities for diversifying financial risk will lead households to save less for precautionary reasons, once financial risk has been mitigated through diversification. Italian households need instead to save more than US households for precautionary reasons. Because of the lower level of financial market development, there are fewer instruments available in Italy for protection against uninsurable risks, be they direct (private insurance), or indirect (portfolio diversification to reduce total risk). Introducing a portfolio diversification index, it is possible to control for the degree of financial sophistication. The portfolio diversification index represents, therefore, the extent to which people rely on capital markets. Unless asset returns are perfectly correlated, a well diversified portfolio may help households to self insure against idiosyncratic financial risk. Therefore, transition into entrepreneurship could be affected by the level of financial market development. By affecting the amount of precautionary wealth accumulated, financial market imperfections establish a link between household saving decisions and occupational choice. In our context, this is important, since private savings and investment decisions are not separable. Introducing an index of financial diversification, we are able to control for the degree of a country's financial development and at the same time to determine the extent to which it affects the process of household capital accumulation.

4. Data and descriptive statistics.

Data and sample selection

Data for Italy are drawn from several waves of the Survey of Household Income and Wealth (SHIW), conducted every two years by the Bank of Italy. The survey contains detailed

[9]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).

information on household social, demographic and economic characteristics. Moreover, in 1995 a question was introduced for household heads, making it possible to derive a measure of risk aversion[10]. Data on wealth composition and business ownership are also provided. I consider 9 waves of SHIW, from 1989 to 2006.
Data for the United States are taken from the Panel Survey of Income Dynamics (PSID). This survey was conducted almost annually, from 1968 to 2006. However, information about wealth composition was only contained in the 1984, 1989, 1994, 1999, 2001 and 2003[11]waves.
Similarly to the SHIW, a question about risk tolerance was included in the 1996 wave of the PSID. For both countries I only consider household heads aged between 16 and 70, who were interviewed for at least two survey waves, and who had been in the workforce for at least one year. Moreover, I only analyze individual occupational choices for the main occupation. Finally, I exclude all those households where the head has changed.

Definition of entrepreneur

In regard to the present analysis, the distinction between entrepreneurs and non entrepreneurs ("wage earners" henceforth) is a key point. Several definitions of entrepreneur and entrepreneurship have been used in the literature. According to one strand of literature (Hurst and Lusardi, 2004; Cagetti and De Nardi, 2006; Gentry and Hubbard, 2004), an entrepreneur is someone who owns a business, creates jobs and makes active business investments. According to another (Evans and Leighton, 1989; Evans and Jovanovic,1989; Blanchflower and Oswald, 1998; Fairlie, 1999) an entrepreneur is someone who declares to be self-employed. Both PSID and SHIW allow for the use of these two different definitions of entrepreneurship. Each year the household head was asked whether he was a wage earner or self employed. Moreover, a detailed section about household wealth- and therefore business ownership- is contained in both surveys. It is worth noticing that in both surveys, whereas information about self employment is asked to each household member, information about business ownership provided by the household head may refer to any one of the household members.
In the empirical analysis, I will consider the two definitions of entrepreneur. According to the first definition (*self_employed1*), a household head is an entrepreneur if he declares him/herself as self employed. According to the second (*self_employed2*), a household is an entrepreneurial one if the household head or other household member owns a business whose value is greater than zero. Therefore, *self_employed1* focus on the job declared by the individual, whereas *self_employed2* places the emphasis on household wealth composition, and in particular on business ownership. Though both definitions are good candidates for identifying entrepreneurs, *self_employed2* better suits our needs. *Self_employed1* actually also includes freelancers, or professionals, who probably require a very small investment to start their activity. Therefore, empirical specifications will mainly rely on *self_employed2*, whereas *self_employed1* will be used

[10]See Guiso and Paiella (2003).
[11]Although the Survey of Consumer Finance contains much more detailed information about household wealth composition, it is mainly cross sectional. Using the Panel Survey of Income Dynamics it is instead possible to keep track of household occupational choices and wealth composition for several years. Moreover, wealth distribution in the PSID closely matches that in the SCF (Hurst, Luoh, and Stafford 1998).

for robustness checks.
In actual fact, using a definition of entrepreneurship that relies on household data about wealth composition is not devoid of problems. A zero value for *self_employed2*, may well mean that the household does not own a business, or owns a business whose value is zero. However, the main results do not change when *self_employed1* is used. Moreover, using *self_employed1*, and selecting only those households with a positive business value the results remain basically unchanged[12]
Following previous studies, rather than focusing on the probability of being an entrepreneur, I focus on the probability of becoming an entrepreneur. When we focus on the relationship between business start ups and initial household wealth, we actually need to look at initial net wealth as a cause, rather than the effect, of individuals' occupational choices[13]
To analyze transition into entrepreneurship, I examine pairwise several waves of SHIW and PSID. As far as SHIW is concerned, the years are paired as follows: 1989-1991; 1991-1993; 1993-1995; 1995-1998; 1998-2000; 2000-2002; 2002-2004, 2004-2006. Except for 1995-1998, a two-year gap is considered. As far as the first definition of entrepreneur is concerned, in the PSID I also analyze household heads who switch to entrepreneurship after 2 years. Therefore, the following years were paired: 1984-1986; 1989-1991; 1994-1996; 1999-2001; 2001-2003.
As far as *self_employed2* is concerned I use a broader time span, since questions about household wealth in the PSID were not asked every year, but only in 1984, 1989, 1994, 2001 and 2003. Since wealth changes are very widely distributed, I have limited the influence of outliers by truncating the top and bottom 1 percent of the change in wealth distribution.
Table 1.a shows the percentage of entrepreneurs in Italy and in the United States according to *self_employed1* and *self_employed2*. Using both definitions of entrepreneur, we observe a higher percentage of entrepreneurs in Italy than in the US. Using the first definition, entrepreneurs in Italy are 26.40%, against 12.77% in the US, whereas using the second definition, the percentages are 24.85% and 10.48%, respectively. Table 1.b on the other hand shows the distribution of entrepreneurs over wealth quartiles. In both countries, entrepreneurs are concentrated in the highest wealth quartile.
Table 2.a shows the percentage of those who switch from wage earners to entrepreneurship for the two definitions of entrepreneurship *self_employed1* and *self_employed2*. In particular, variables *switch1* and *switch2* take a value of 1 if the household head was a wage earner at time t, and becomes an entrepreneur in the following period, according to the first and second definitions of entrepreneur, respectively.
Table 2.b presents the percentage of switching entrepreneurs by net wealth quartiles, according to the first and the second definitions, respectively. In both countries the majority of households who switch to entrepreneurship are concentrated in the highest wealth quartiles. This feature is particularly significant when considering *switch2*, which is not surprising. Considering business ownership instead of simply self employment implies making non-negligible investment, which probably requires households to be in high wealth quartiles.

[12]Results are not reported, but they are available on request.
[13]In this sense, finding a positive relation between net wealth and the probability of being an entrepreneur simply means that entrepreneurs hold an higher level of wealth, compared to wage earners.

Descriptive statistics (demographics)

Table 3.a gives the descriptive statistics of the main variables used in the empirical analysis. Furthermore, in order to draw preliminary information about the existence of significant differences between staying workers and switching entrepreneurs, some descriptive statistics about demographical and financial characteristics of households are presented, according to definitions *switch1* and *switch2*.
As far as demographic characteristics are concerned, there are no striking differences between Italy and the US.
Using *switch1* and *switch2*, in both countries switching entrepreneurs are younger than staying workers and mainly male. Those who switch to entrepreneurship are mainly married in the US, whereas in Italy the opposite holds true. Moreover, significant differences between switching workers and switching entrepreneurs exist as far as family size is concerned, especially when *switch2* is taken into account. Switching entrepreneurs have a larger number of household members than staying workers. In actual fact, in a household with more than one earner uninsurable risks can be shared among the household.
Significant differences are observed between Italy and US regarding education. In the US, potential entrepreneurs are generally better educated than staying workers. This result holds true especially when we consider entrepreneurs as business owners, rather than simply self-employed. In Italy on the contrary, switching entrepreneurs are less educated than wage earners (but the difference is only significant when *switch2* is taken into consideration).
As far as support from relatives/friends is concerned, significant differences are found in the two countries when using *switch1* compared to *switch2*. Actually, support from parents seems to be significant only when we take into consideration self employed, rather than business owners. This distinction is not trivial: if we consider entrepreneurs as self employed then this category will also include professionals and freelancers, who probably do not require a high initial capital investment. Occupational status of the father seems to play a fundamental role in both countries: household members who switch to entrepreneurship are those whose father was a business owner.
Finally, switching entrepreneurs in both countries have a greater net wealth, and a higher household income than staying workers.

Descriptive statistics (Wealth composition and portfolio diversification)

In section 3 I highlighted the main institutional differences between Italy and US, arguing that these differences may affect whether households select into entrepreneurship. In particular, I claim that a different level of financial and credit market development could be non neutral to household occupational choices. In this regard, a descriptive analysis of household wealth component would shed some light on the existence of significant differences between switching entrepreneurs and staying workers within and between countries. So far, the literature has argued that initial wealth is non neutral to household occupational choices. However, the level of development of financial and credit markets may strongly influence household occupational choices, affecting not only the amount, but also the composition of personal wealth.

Tables 4.a and 4.b show some descriptive statistics for wealth composition of switching entrepreneurs in Italy and US respectively[14]. In Italy as in the US the bulk of real asset is given by the main house, which represents more than 50% out of total real assets. As far as portfolio composition is concerned, we observe that in Italy switching entrepreneurs hold a larger percentage of real assets than staying workers. This result holds true when *switch1* and *switch2* are used. However, traditional p-value tests reject the hypothesis of equality of this ratio between staying workers and switching entrepreneurs only when *switch2* is taken into account[15]. The ratio between financial assets and total net wealth is slightly higher for switching entrepreneurs in Italy, but differences are not significant. Significant differences instead exist between Italy and US as far as the ratio total liabilities/total net wealth is concerned. In Italy this ratio does not reach 10% when considering both definitions of entrepreneur. In the US we notice instead that it is around 50%. Actually, this is in favor of the thesis according to which US households rely on financial market more than Italian ones. Moreover, in both countries this ratio is higher for staying workers rather than switching entrepreneurs. It is plausible that those who want to set up a business should not have an high indebtness before switching in case they need to ask for a loan to a financial institution.
The last 2 lines of table 4.a and 4.b show average values for the index of portfolio diversification. Actually, diversifying their portfolio, households are indeed able to reduce idiosyncratic risk correlated to their investments, and therefore to reduce total uncertainty. There are two measures of portfolio diversification which are mainly used in the literature. The first one is simply the number of assets in the portfolio. However, this measure requires assets to be evenly distributed in households portfolio.
Therefore, I employ instead the following measure of diversification, calculated as the inverse of Herfindhal index, which is one of the most widely used measures of concentration.

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

where w_i is the weight of asset i in households' portfolio. An index equal to 1 means maximum diversification, whereas an index value equal to 0 means that all the wealth is concentrated in one only asset. Due to data limitations, our index of financial diversification is limited to 5 categories of assets. However, it may be used as a proxy of financial sophistication.

The level of detail for wealth composition in the PSID is coarser than the SHIW[16]. However, this is

[14]Classification of financial and real assets and liabilities, and the way in which wealth is computed are described in the appendix.
[15]Actually, switching entrepreneurs have a greater percentage of financial wealth invested in relatively risky assets (i.e. stocks and bonds). However, this may be explained by the relatively lower degree of risk aversion of entrepreneurs and potential entrepreneurs.
[16]SHIW provides every year detailed information about households wealth composition. In particular, for each household in the SHIW detailed information about real assets, financial liabilities and almost 21 types of financial assets are provided. As far as financial assets are concerned, PSID allows us to distinguish among only 3 categories of financial assets. The first one is given by relatively safe assets: checking or savings accounts, money market funds, certificates of deposit, government savings bonds, or treasury bills. The second one is given instead by relatively risky assets such as stock in publicly held corporations, mutual funds, or investment trust. The third group is represented by other assets such as bonds, rights in a trust or estate and cash value in a life insurance policy.

not a problem in the present analysis[17].
Actually, the diversification index proxies for households' degree of trust in capital markets, and measures the level of financial sophistication, which may affect capital accumulation. Actually, a country with a better developed financial market should provide households with better opportunities for protecting themselves against uninsurable risks. Consequently, controlling for education and attitudes towards risk, we should observe switching entrepreneurs in the US who diversify their portfolio in order to better protect themselves against idiosyncratic risk.
Tables 4.a and 4.b show average values for 2 indexes of diversification: *div1*, which includes only financial assets, and *div2*, which also includes real assets. The average value of the portfolio diversification index differs substantially for switching entrepreneurs and staying workers. However, as expected, these differences are only significant in the US.
In order to better assess the role of demographic and financial determinants of entrepreneurship it is preferable to carry out a regression analysis.

5. Regression Analysis.

5.1 Initial net wealth.

The first step for exploring the differences between Italian and US households' probability to start a business is to assess whether initial wealth affects the probability of starting up a business. To do that, I consider pairwise several waves of the SHIW and of the PSID. All households which are not entrepreneurs (according to definitions *self_employed1* and *self_employed2*) in the first period are considered in the whole sample, pooled together. The dependent variable is equal to 1 if the household becomes an entrepreneur, whereas it equals 0 if the household remains a wage earner. All explanatory variables are considered in the initial period. Therefore, as in previous literature, I take into account the probability of switching to entrepreneurship (from salaried employment, or unemployment), instead of the probability of simply being an entrepreneur. However, I deviate from previous work in several ways. First of all, I take into account several time gaps between the first and second period. In this regard, I deviate from Hurst and Lusardi (2004), who take into consideration a 1 year gap, considering a two-year (*self_employed1*) and 4 (SHIW) and 5 (PSID) year (*self_employed2*) gap. This is due not only to the fact that SHIW is a biannual survey, but also to the need to deal with the endogeneity of initial net wealth. It is likely that those who want to set up a business accumulate assets in advance. In this sense, initial net wealth 4, or 5 years ahead represents a more exogenous measure of wealth.
In order to render Italian and US analysis as comparable as possible, when considering business owners as entrepreneurs (*self_employed2*) the empirical estimation will be performed taking into consideration a similar time span in both countries. Tables 5.1 and 5.2 show the results of a probit regression using Italian and US data, where the dependent variable is *switch1* and *switch2*, respectively. Actually, performing the empirical analysis using both definitions makes it possible

[17]For a robustness check in the regression analysis I compute a broader diversification index for Italian households, using the information about 21 financial assets. Results are basically unchanged.

to check the robustness of results. Moreover, definition *self_employed1* includes self employed in general - and therefore also freelancers and professionals, who probably do not require high levels of capital outlay to start up a business. On the other hand, definition *self_employed2*, by focusing on business ownership rather than self employment, allows one to consider only those households which face a non negligible investment to setting up a business. This is particularly significant as the issue at stake is whether initial net wealth is more likely to affect household occupational choices when a non negligible initial investment is required.
All specifications include several demographic controls, such as a quadratic function of age and years of education, the number of household members, a dummy which indicates whether the household head is married and a dummy which indicates that the household head is male. Net wealth and household head's labor income the year before switching are included in the regression. Moreover, following previous studies (i.e. Magri, 2009) education of the father and a dummy that indicates whether household head's father was an entrepreneur, are included in order to check for unobserved ability which may give rise to spurious results. Each regression also includes year dummies.
In specification (I) only demographics, initial net wealth and labor income are included. When switching entrepreneurs according to *switch1* are taken into account (table 5.1), the initial level of net wealth in both countries is found to be significant at 1% level. Further, the economic impact of initial level of resources is not trivial. Increasing net wealth by 100,000 Euros at t-2, increases the probability of switching to self employment by 0.35% (Italy) and 0.38% (US). Given that in Italy the estimated probability of becoming an entrepreneur in the subsequent year is 2.49%, an increase in 100,000 euro would increase the probability of switching to self employment by roughly 14%. In the US the increase is instead almost 10%.
When *switch2* is taken into account, more significant differences are observed between Italy and US. Actually, increasing (at t-4) net wealth by 100,000 Euros would increase the probability of acquiring a business in the following period by only 1%, whereas this figure is close to 23% in Italy. Moreover, the initial level of net wealth is still significant at 1% level in Italy, whereas it becomes insignificant in the US.
Furthermore, in Italy initial labor income is highly significant and negatively signed. The negative and significant coefficient associated to family income I found in Italy is actually in line with Evans and Leighton (1989) and with some behavioral studies on entrepreneurship, according to which those who switch to entrepreneurship are those with low paid jobs, or unemployed, who try to improve their condition by switching to self-employment[18].
From this perspective, the difference between the two countries may be explained looking at a country's institutional job environment, in terms of unemployment rate, or flexibility in the job market for example. In Italy higher unemployment together with greater labor market rigidities may be the cause of the negative and significant relation between the likelihood of switching to entrepreneurship and labor income[19]. In specification (II) total income (calculated as the sum of

[18]See Rees and Shah (1986) for example.
[19]To strengthen this hypothesis I performed specification (I) for the Italian subsample, where family income interacted with a dummy for geographical area. I found that in regions with higher unemployment the coefficient associated with family income is not only more significant but also higher. Results are not included but they are available on request.

labor income, transfers and asset income) is included. Actually, it is positively signed and significant only in the US (*switch2*).
In this regard, Fairlie and Krashinsky (2006) suggest that rates of entry to entrepreneurship are not neutral to the employment status before entry. They demonstrate that the wealth constraint has more impact on those who were unemployed before entry to entrepreneurship than on the employed.
Therefore, a dummy was introduced which takes a value of one if the household head was unemployed in the period prior to setting up a business, or becoming self employed. As expected, it is negative and significant for both countries. Family background is found to be very important. The level of education of the father and a dummy which takes a value of 1 if the household head's father was himself an entrepreneur, are found to positively affect transition into entrepreneurship[20]. In order to check for unobserved ability, previous experience as an entrepreneur is included in the estimation. It is highly significant in both countries.
In specification (III) risk attitudes are taken into account. The number of observations diminishes, since a question about attitudes towards risk was only included in the 1995 (SHIW) and 1996 (PSID) surveys. Therefore, only households interviewed in those years and in subsequent waves were included in the sample. However, it is plausible to assume that risk attitudes remain constant over time (Paiella and Chiappori, 2008; Brunnermeier and Nagel, 2008)[21]. As Cressy (2000) pointed out, if risk aversion is a negative function of wealth, the positive effect of wealth on entrepreneurship transition may be spurious, and due to the omission of risk aversion. In this regard, net wealth should not have any effect on household occupational choices when risk attitudes are accounted for. In order to test for this prediction, the interaction term between household attitudes towards risk and net wealth is included (specification 3). Cressy's prediction is not borne out in Italy. The marginal effect of net wealth is indeed still positive and significant.
Finally, to eliminate households where the household head is close to retirement, in specification (IV) only household heads aged less than 55 are included. Previous results are basically unaffected.

5.2 Alternative specifications.

Table 6.1 presents some further exercises. As in Hurst and Lusardi (2004) wealth quartiles are included instead of initial wealth. Unlike Hurst and Lusardi, however, the role of expected liquidity constraints and parent support are explicitly taken into account.
Following Hayashi (1984) a household is defined as constrained if net wealth is less than two months income, unconstrained otherwise. Even if it this is not a precise measure of liquidity constraints, it is likely that those households with wealth below a certain threshold would be

[20]In both surveys the level of education as well as the occupation considered refer to the household head's father when young.
[21]Using data from PSID and SHIW they demonstrate that households' investment in risky assets show a very low (and statistically insignificant) elasticity to wealth fluctuations. In this sense, household risk aversion cannot be considered as time varying.

rejected when asking for a loan[22].
As well as traditional credit markets, "informal" networks (i.e. help from relatives or friends) may be one way of starting up a business. Moreover, in some contexts, such informal networks may not only complement credit markets, but also replace them. Actually, as Fairlie (1999) and Evans Jovanovic (1989) point out, help from parents is a typical way of overcoming borrowing constraints.
In specification (I) of table 6.1, a dummy taking a value of 1 if the household is constrained according to the above definition is included in the estimation. It is found to be negative for potential Italian entrepreneurs. Moreover, when *switch2* is considered, the liquidity constraint indicator is significant at 1% level. Having a low wealth-to-income ratio actually seems to prevent potential Italian entrepreneurs from starting a business, especially when business ownership- rather than simply self employment - is taken into consideration.
Specification (II) includes an interaction term between liquidity constraints and help from parents/friends (*no_help*constrained*)[23]. As far as Italy is concerned, information about households receiving financial support from parents or friends was not asked in 1991 and 1993. Therefore, the number of observations reduces to 7129 (*switch1*) and 4152 (*switch2*).
As table 6.1 shows, when *switch1* is taken into account, the interaction term between informal help and (expected) liquidity constraints is negative and significant at 1% level for Italian switching entrepreneurs. Therefore, credit market imperfections in the form of liquidity constraints have a strong negative impact on those Italian switching entrepreneurs who do not receive any support from informal networks. However, when *switch2* is taken into account, the interaction term turns to be positive and significant. From this perspective, even those households who receive help from relatives or friends find binding liquidity constraints as a non-negligible obstacle when setting up a business. A complementary relation does indeed exist between "formal" and "informal" credit channels. However, the role of "informal networks" in offsetting credit market rigidities is significant only when the households intend to start a business which does not presumably require an high level of initial capital[24]. In this regard, Italian households with a relatively low level of wealth, may find help from parents an important means of setting up a business without having to rely on credit markets.
On the contrary, in the US liquidity constraints are found not to be significant. Actually, the interaction term between parent help and liquidity constraints is found to be insignificant for both *switch1* and *switch2*.
In order to highlight cross country differences between Italy and US, I performed a further

[22]Actually, SHIW contains a specific question which allows to identify constrained households as those who apply for, but are not granted, a loan. However, PSID does not contain any such information (it is instead contained in the Survey of Consumer Finance). As a robustness check, I performed the same analysis of table 6.2 using the alternative definition of liquidity constraints. Results do not change.
[23]*no_help* takes value 1 if the household did not receive any help from parents or friends the period before switching to entrepreneurship.
[24]Actually, when considering the total effect of liquidity constraints, we found it is positive when *switch1* is taken into account, whereas negative using *switch2*. This is not surprising: credit market imperfections are likely to affect trasition into entrepreneurship especially for those business which probably require a non- negligible initial investment.

analysis. In table 6.2 the financial diversification index *div2*, calculated as the inverse of the Herfindhal index, is included in the estimation. It is a very general measure of the diversification of financial portfolio. Actually, it has been used to measure the extent to which investors, by diversifying their portfolio among assets whose returns are imperfectly correlated, try to protect themselves against financial risk. Due to data limitations, this index of financial diversification is limited to 5 categories of assets. However, it is a good proxy of financial sophistication[25]. As Guiso, Haliassos and Jappelli (2003) point out, significant differences exist between Italy and US stock market participation and portfolio composition. What we need to explore is whether these differences affect transition into entrepreneurship.

As table 6.2 shows, the financial diversification index is positive in US, but negative in Italy. Moreover, considering business ownership definition, in the US the diversification index is significant at 1% level.

From this perspective, US households rely on capital markets to diversify uninsurable financial risk. However, these results may be plagued by endogeneity problems. Those who decide to switch to entrepreneurship may not only accumulate assets beforehand, but they may also accumulate wealth in such a way as to reduce somewhat financial risk. In order to deal with endogeneity issues, the financial diversification index is instrumented with household head's level of education and household head's father level of education. As specification (II) of table 6.2 shows, previous results are confirmed. The index of financial diversification is positive and highly significant for potential US business owners, whereas it is negative for Italians.

Finally, I tried another empirical exercise. Table 6.3 presents IV estimation of previous equation, when net wealth and financial diversification index are instrumented with household head level of education and household net wealth two periods before[26]. Previous results are confirmed. Financial diversification index is positive and highly significant for US switching entrepreneurs, whereas it turns to be not significant for Italian ones. Further, the initial level of net wealth is still significant at 1% level , whereas it turns to be negative- but not significant for US ones.

6. Changes in wealth and transition into entrepreneurship.

Changes in net wealth, rather than initial net wealth, may prove a more powerful instrument for explaining the transition to entrepreneurship. First of all, potential entrepreneurs may accumulate assets before making the switch. In this regard, Buera (2009) develops a dynamic model with borrowing constraints, finding that borrowing constraints make households with wealth above a certain threshold save in order to become entrepreneurs. On the contrary, those with a level of wealth below this threshold remain wage earners, being trapped in a "poverty trap" forever. Using 1989 and 1994 waves of the PSID, Lusardi and Hurst (2004) check whether 5 year changes in wealth affect the probability of switching to entrepreneurship. They found that

[25]Actually, SHIW contains detailed information about household ownership of 21 assets. In order to check for the robustness of results, an alternative index of financial diversification is calculated, using detailed information from Italian data.

[26]Net wealth 4 years before switching to entrepreneurship is therefore instrumented with net wealth 8 years before switching for the Italian case. In the US, net wealth 5 years before switching to entrepreneurship is therefore instrumented with net wealth 10 years before switching.

the coefficient associated with changes in net wealth is not only negative but also not significant. However, the relation between changes in wealth and entrepreneurship transition may be plagued by an endogeneity problem. First of all, entrepreneurial households tend to save more in anticipation of a business opportunity, in order to face downpayment requirements, for example. Secondly, households use unanticipated increases in wealth, such as capital gains or properties in order to pay for the cost of a business (Caner, 2003).
Therefore, changes in net wealth and the probability of switching to entrepreneurship need to be estimated simultaneously.
Considering the decision to switch to entrepreneurship as endogenous to wealth accumulation, it can be assumed that some unobserved characteristics that affect the likelihood of setting up an entrepreneurial activity, could also influence capital accumulation before switching. Actually, we can suppose that households base the decision to become an entrepreneur on the additional wealth they would gain by switching from salaried employment to entrepreneurship. The equations representing changes in net wealth and the probability of switching can indeed be formally written as an endogenous switching regression:

(6.1) $\ln\Delta W^1_{i,t} = X'_{i,t-1}\beta_1 + u_{1,i}$

(6.2) $\ln\Delta W^2_{i,t} = X'_{i,t-1}\beta_2 + u_{2,i}$

(6.3) $I^*_i = (\ln\Delta W^1_{i,t} - \ln\Delta W^2_{i,t})\delta + Z_i\gamma + v_i$

I^*_i is a latent variable that determines whether the household head is a switching entrepreneur or a staying worker. The dependent variable in equations 6.1 and 6.2 is calculated as the logarithm of the change in net wealth (excluding the value of the business acquired at t+1 from this definition of wealth)[27] , standardized by household income calculated at the initial period. $\ln\Delta W^1_{i,t}$ and $\ln\Delta W^2_{i,t}$ are, respectively, the dependent variable for switching entrepreneurs and staying workers[28]. Z_i is a vector of characteristics affecting the decision of starting a business, whereas $X_{i,t-1}$ is a vector of characteristics affecting accumulation of net wealth. β_1 , β_2 and γ are vectors of parameters, and $u_{1,i}$, $u_{2,i}$ and v_i are disturbance terms. The observed dichotomous realization I_i of latent variable I^*_i of whether the individual is a switching entrepreneur has the following form:

$I_i = 1$ if $I^*_i > 0$

$I_i = 0$ otherwise

[27]Business investment is part of total net wealth. One can readily find a strong and positive correlation between wealth accumulation and the probability of starting a business because a business is acquired at t+1. To avoid this problem, I consider wealth accumulation, omitting business value from total net wealth.
[28]The value of the business acquired the following period is excluded from the estimation.

Substituting from (6.1) and (6.2) we can write (6.3) as:

$$I_i^* = X'_{i,t-1}(\beta_1 - \beta_2)\delta - \epsilon_i$$
$$= W'_i\alpha - \epsilon_i$$

where $W'_i = [X'_{i,t-1}, Z_i]$, and

$$\epsilon_i = (u_{1,i} - u_{2,i})\delta + v_i$$

Assume that $u_{1,i}$, $u_{2,i}$ and ϵ_i have a trivariate normal distribution. Moreover, the following assumptions hold:

(a) $\sigma_{1,2} = 0$
(b) $\sigma_{1,\epsilon} \neq 0; \sigma_{2,\epsilon} \neq 0$
(c) $\sigma_\epsilon^2 = 1$

Given these assumptions, the variance-covariance matrix Σ can be written as:

$$\Sigma = \begin{pmatrix} \sigma_1^2 & & \\ 0 & \sigma_2^2 & \\ \sigma_{\epsilon,1} & \sigma_{\epsilon,2} & 1 \end{pmatrix}$$

Actually, separate estimates of equations (6.1) and (6.2) yield inconsistent parameter estimates if wage earners differ in observed and unobserved characteristics from switching entrepreneurs. Equations (6.1-6.3) can be simultaneously estimated through maximum likelihood estimation, correcting for the selection bias.
Because of the institutional differences between Italy and the US, capital accumulation should

matter more for Italian households than for US ones. This is not only due to higher downpayment requirements in Italy, but also to more severe credit market imperfections, which may lead Italian households to rely more on their own resources rather than asking for a loan.
Table 7 show the results of the estimation of equations (6.1-6.3). The right hand side of equations 6.1 and 6.2 contains a set of demographic controls, such as age, age squared, years of education, sex , family size and civil status. Moreover, I improve on Hurst and Lusardi's analysis (2001) by controlling financial sophistication, which may affect regression results, leading to spurious correlation between the probability of starting up an entrepreneurial activity and changes in net wealth. To proxy for financial sophistication, I use the inverse of Herfindhal index, which is a measure of household portfolio dispersion. Further, controls for wealth quartiles are included.
Finally, in order to improve identification of the selection equation, previous experience as an entrepreneur and household head father's level of education are included.
In columns (I) and (II) the rate of growth of net wealth for staying workers and switching entrepreneurs are included, whereas column (III) shows the probit estimation of equation 6.3.
Rho_0 and *rho_1* represent the correlation coefficients between the error term of the selection equation (6.3) and error terms of equations (6.1) and (6.2), respectively. In Italy the correlation coefficient *rho_1* is positive and significant at 1% level when both *switch1* and *switch2* are considered. Since *rho_1* is negative and significantly different from zero the model suggests that individuals who choose to switch to entrepreneurship have higher capital accumulation than a random individual. On the contrary, in the US *rho_1* is negative, and significant only when *switch1* is taken into account .

7. Conclusions

In this paper, I use microdata from Italy and US to assess the determinants of selection into entrepreneurship and to investigate whether institutional differences between these two countries affect household labor market decisions. I empirically assess the probability of starting a business in a common framework, in order to detect similarities and differences between the two countries. Following previous literature, I employ two different definitions of entrepreneur. The first one considers entrepreneurs as self employed, whereas the second one focuses on business ownership. Then, on the basis of observed differences between Italy and US, I formulated several theoretical predictions, which have been tested empirically.
First of all, I argue that greater imperfections in the Italian credit market make Italian households relying to a greater extent on initial net wealth than in the US. Actually, in both countries having a high level of wealth increases, *ceteris paribus*, the probability of starting up a business. However, when business ownership- rather than self employment- is taken into account, the marginal effect of increasing initial net wealth is much higher and significant for potential Italian entrepreneurs compared to their US counterparts.
Secondly, the role of informal credit channels, such as help from relations or friends is addressed. I argue that "informal markets" can represent an important alternative to traditional credit channels, especially for potential Italian entrepreneurs, in particular those who are more likely to be constrained. I found that help from relations or friends partly offsets credit constraints for Italian households, whereas it is not important for US households.
Then, I fill a gap in the literature by introducing an index of financial diversification. Despite considering households' private wealth as being linked to occupational choices, previous studies

fail to analyze whether the composition (rather than the mere amount) of wealth affects households' probability of switching to entrepreneurship. From this perspective, the index of portfolio diversification, calculated as the inverse of Herfindhal index, measures the extent to which households rely on capital markets. It clearly emerges that better opportunities for diversifying financial risk will lead households to save less for precautionary reasons, once financial risk has been mitigated through diversification. As far as the comparative analysis is concerned, financial diversification is found to positively affect transition into entrepreneurship for US households, whereas it is not significant for Italians. This result is robust to alternative specifications taking into account the potential endogeneity of financial diversification index.

Last but not least, the role of capital accumulation is taken into consideration. The level of financial development is indeed not neutral to capital accumulation. On the one hand, potential entrepreneurs need to accumulate assets in order to have sufficient collaterals to secure a loan. On the other, capital accumulation may well be the only channel through which "discouraged" households are able to obtain the capital needed to start a business. Actually, unobserved factors affecting wealth accumulation may also affect the decision to start a business. Therefore, a separate estimate may lead to spurious results. Using an endogenous switching regression helps to cope with this problem. Estimating simultaneously changes in net wealth and the probability of switching to entrepreneurship, reveals that capital accumulation is significantly higher for potential entrepreneurs in Italy. By contrast, potential entrepreneurs in the US do not show significantly higher capital accumulation compared to wage earners.

Summing up, institutional differences seem to partially affect the decision to start a business. Greater imperfections in Italian credit markets mean that "informal networks" are more likely to be created. Besides credit markets, a greater degree of financial sophistication positively affects household occupational choices. The availability of more financial instruments, helping US households to better deal with uninsurable risks, weakens the link between household wealth and investment decisions. Moreover, asset accumulation is found to be an important device for business start ups, especially in a country- like Italy- with more severe credit markets imperfections.

The usefulness of this comparative analysis is not devoid of policy implications. Government stimulus packages, such as tax cuts or entrepreneurial loans might not be useful if entrepreneurial choice depends simply on personal traits, such as attitudes towards risk. But if the wealth-entrepreneurship link is in place, governments can stimulate business start ups not only by direct incentives to firms, but also through capital market development, which would in turn lead to better incentives for private savings. In this sense, a better developed financial market would weaken the link between personal wealth and business start ups not only in a direct manner (i.e. by relaxing borrowing constraints), but also by allowing potential entrepreneurs to better deal with uninsurable risks, and to accumulate more easily the assets required to set up a business. In this regard, differences in insurance and pension systems, that affect private savings behavior, are therefore able to indirectly influence household occupational choices.

Appendix
Data-Italy

The data used in this study come from the Survey of Household Income and Wealth (SHIW). It is carried over biannually. In this study, I consider 9 waves of PSID, from 1989 to 2006.
All nominal variables are converted in euro, and expressed at 2003 prices.
In this article, household total net wealth is calculated as the sum of the following components:
(1) main house value.
(2) net value of farm or business assets
(3) net value of any other valuable asset.
(4) mortgage.
(5) value of checking or saving accounts, postal bonds, certificates of deposit.
(6) government bonds
(7) any other savings or assets, such as bond, stocks, a valuable collection for investment purposes, or rights in a trust or estate.
(8) Any other debt besides mortgage.

Real assets are calculated as the sum of (1), (2), (3) and (4).
Financial assets are calculated as the sum of (5) (6) and (7).
Financial liabilities are calculated as the sum of (4) and (8).

Data-US

The data used in this study come from the Panel Study of Income Dynamics (PSID). This survey has been carried over since 1968. However, information on wealth components was collected since 1984, and every five years. From 1999 to 2003 instead, questions about wealth were asked every two years. In this study, I consider 6 waves of PSID, from 1984 to 2003.
All nominal variables are expressed at 2003 prices, and converted in euro.
In this article, household total net wealth is calculated as the sum of the following components
(1) main house, net value.
(2) farm or business assets, net value
(3) net value of any real estate other than main home, such as a second home, land, rental real estate, or money owed to you on a land contract
(4) value of checking or saving accounts, money market funds or investment trusts, savings bonds, Treasury bills, including IRAs (IRAs asked separately in 1999).
(5) value of shares of stock of publicly held corporations, mutual funds or investment trusts, including stocks in IRAs (IRAs asked separately in 1999).
(6) any other savings or assets, such as bond funds, cash value in a life insurance policy, a valuable collection for investment purposes, or rights in a trust or estate.
(7) Any other debt besides mortgage.

Real assets (gross value) are calculated as the sum of (1), (2) and (3), plus the mortgage on the main house.
Financial assets are calculated as the sum of (4), (5) and (6).
Financial liabilities are calculated as the sum of mortgage on main house, plus (7).

In section 6, the definition of net wealth excludes the business value.

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TABLE 1.a Entrepreneurship rates in Italy and United States.

	ITALY	US
Definition of entrepreneur		
Self_employed1		
0	73.59	87.33
1	26.40	12.67
Self_employed2		
0	75.14	89.51
1	24.85	10.48

TABLE 1.b Entrepreneurship rates in Italy and United States, by wealth quartiles.

	I quartile	II quartile	III quartile	IV quartile
Definition of entrepreneur				
Self_employed1				
Italy	13.16	21.54	26.59	44.26
US	5.42	5.64	9.08	23.71
Self_employed2				
Italy	5.90	16.70	21.73	40.93
US	2.94	6.20	11.34	30.75

Table 1.a and table 1.b show the percentages of wage earners and self-employed, overall, and by wealth quartiles. Calculations are made using 23,476 observations from the pooled data of the SHIW (1989-2006) and 41,069 observations from the pooled data of the PSID. Italian data are weighted using SHIW sampling weights, whereas US ones are weighted using PSID sampling weights. *Self_employed1=1* if the household head report to be self-employed, 0 otherwise. *Self_employed2=1* if the household head or other household member owns a business whose value is greater than zero.

TABLE 2.a Switching entrepreneurs in Italy and US.

	ITALY	US
Switch1		
0	96.41%	96.3%
1	3.58%	3.69%
Switch2		
0	92.76%	94.65%
1	7.23%	5.35%

TABLE 2.b Switching Entrepreneurs in Italy and United States, by wealth quartiles.

	I quartile	II quartile	III quartile	IV quartile
Definition of entrepreneur				
Switch1				
Italy	3.38	3.32	3.75	4.16
US	3.32	2.67	3.64	4.93
Switch2				
Italy	5.82	6.90	7.69	10.10
US	3.79	5.83	7.60	9.61

Table 2.a shows the percentages of those who switch to entrepreneurship according to definition *self_employed1* (*switch1*) and *self_employed2* (*switch2*), respectively. *switch1* takes value 1 if the household head was wage earner in the initial period, and he becomes entrepreneur the following one. *switch2* takes value 1 if the household head or another household component were wage earners at time t, and they he become business owners the following period. As far as *switch2* in PSID data is concerned, a longer time span is considered from 1984 to 1999 (5 years gap), whereas 2 year gap is considered from 2001 to 2003. **Table 2.b** shows the percentages of switching entrepreneurs classified by wealth quartiles.

Table 3.a Variables used in the empirical analysis- descriptive statistics

	MEAN		MEDIAN		MIN		MAX	
	IT	US	IT	US	IT	US	IT	US
Age	45.84	41.79	45	41	16	16	70	70
Years of education	10.10	12.59	8	12	1	1	21	21
Net wealth	185.08	112.69	125.13	37.11	-3.40	-21.48	154,155	155,546
Fin. liabilities	6.60	156.55	0	6.383	0	0	1,183	10,200
Business value	26.33	27.36	0	0	0	-20.68	8,870	24,500
Household tot. income	33.27	48.74	28.68	37.65	-44.75	-75.30	1,022	3,028
H. head income	12.61	28.16	13.62	22.79	0	0	398	1,220
(dependent job)								

Table 3.b Descriptive statistics-average values (Italy)

	switching e.	wage earners	p-value difference
switch1	A	B	A-B=0
N	(444)	(12171)	
Age	45.14	46.25	0.0228
Sex (dummy)	0.80	0.79	0.7693
Married (dummy)	0.78	0.82	0.0430
years of education	10.39	10.15	0.2411
help parents (dummy)	0.03	0.01	0.0128
father entrep. (dummy)	0.42	0.24	0.0000
family size	3.24	3.36	0.0450
Household net wealth	220,005	160,673	0.0000
Household income	33,361	32,223	0.2123

switch2	switching e	wage earners	p-value difference
	A	B	A-B=0
N	(886)	(11875)	
Age	45.69	46.12	0.2204
Sex (dummy)	0.79	0.83	0.0103
Married (dummy)	0.81	0.85	0.0024
years of education	10.15	10.58	0.0035
help parents (dummy)	0.01	0.01	0.3421
father entrep. (dummy)	0.40	0.24	0.0000
family size	3.44	3.34	0.0161
Household net wealth	201,597	149,557	0.0000
Household Income	36,888	31,418	0.0000

Table 3.c Descriptive statistics-average values (US)

	switching e.	wage earners	p-value difference
switch1	A	B	A-B=0
N	(615)	(16475)	
Age	41.29	40.63	0.1919
Sex (dummy)	0.79	0.71	0.0012
Married (dummy)	0.61	0.56	0.0076
years of education	12.93	12.49	0.0104
help parents (dummy)	0.11	0.08	0.0521
father entrep. (dummy)	0.12	0.07	0.0174
family size	2.91	2.86	0.4624
Household net wealth	299,710.8	215,259.6	0.1010
Household income	52,604	45,018	0.0029

switch2	switching e	wage earners	p-value difference
	A	B	A-B=0
N	(950)	(14095)	
Age	39.98	41.12	0.0036
Sex (dummy)	0.91	0.72	0.0000
Married (dummy)	0.73	0.55	0.0000
years of education	13.65	12.48	0.0000
help parents (dummy)	0.07	0.08	0.2124
father entrep. (dummy)	0.10	0.06	0.0007
family size	3.08	2.86	0.0000
Household net wealth	231,252	125,050.5	0.0006
Household Income	60,543	44,699	0.0000

Table 3.a shows descriptive statistics of the main variables used in the empirical analysis. All nominal variables are divided by 1000, converted in euro, and deflated using 2003 consumer price index.
In **Table 3.b** and **Table 3.c** some descriptive statistics about variables used in the empirical analysis are presented. As far as Italian data are concerned, the sample is obtained considering in pair different waves of the SHIW (1989-1991; 1991-1993; 1993-1995; 1995-1998; 1998-2000; 2000-2002; 2002-2004; 2004-2006). Regarding US data instead, the sample is obtained considering in pair different waves of the PSID. As far as *switch1* is concerned, I considered in pair the following years: 1984-1986; 1989-1991; 1994-1996; 1999-2001; 2001-2003). As far as *switch2* is concerned, I considered in pair the following years: 1984-1989; 1989-1994; 1994-1999; 1999-2001;2001-2003. All households who are not entrepreneurs in the first period according to the definition *switch1* and *switch2* are considered in the whole sample, pooled together. Wage earners do not become entrepreneurs in the second period. New entrepreneurs become entrepreneurs in the second period. All the nominal variables are converted in Euro, at 2003 prices.

Table 4.a Wealth composition Italy

ITALY			
	switching e.	wage e.	p value
switch1	A	B	A-B
real asset/tot. wealth	0.82	0.79	0.2171
fin. asset/tot. wealth	0.23	0.24	0.8328
fin. liabilities/tot. wealth	0.05	0.03	0.2185
main house/real asset	0.51	0.58	0.0017
div1	0.13	0.13	0.9017
div2	0.23	0.22	0.6828
switch2			
real asset/tot. wealth	0.82	0.78	0.0865
fin. asset/tot. wealth	0.25	0.25	0.7719
fin. liabilities/tot. wealth	0.07	0.03	0.1855
main house/real asset	0.60	0.58	0.1875
div1	0.13	0.12	0.1953
div2	0.23	0.22	0.4148

Table 4.b Wealth composition US

US			
	switching e.	wage e.	p value
switch1	A	B	A-B
real asset/tot. wealth	0.94	1.00	0.4819
fin. asset/tot. wealth	0.57	0.58	0.9282
fin. liabilities/tot. wealth	0.51	0.58	0.6159
main house/real asset	0.80	0.89	0.0000
div1	0.15	0.13	0.0785
div2	0.25	0.20	0.0030
switch2			
real asset/tot. wealth	0.81	1.06	0.2724
fin. asset/tot. wealth	0.54	0.59	0.7714
fin. liabilities/tot. wealth	0.35	0.65	0.2106
main house/real asset	0.87	0.93	0.0000
div1	0.19	0.14	0.0000
div2	0.30	0.21	0.0000

The sample considered in **table 4.a** and **4.b** is obtained considering in pair different waves of the PSID and SHIW. All households that in the first period are not entrepreneurs according to the definition *switch1* and *switch2* are considered in the whole sample, pooled together. Wage earners do not become entrepreneurs in the second period. New entrepreneurs become entrepreneurs in the second period. *div1* and *div2* are the financial diversification indexes, calculated as the inverse of the Herfindhal index. *div1* only includes financial assets, whereas *div2* also includes real assets. All the nominal variables are converted in Euro, at 2003 prices. All ratios are obtained by dividing each wealth component by total net wealth.

Table 5.1 The probability to start a business and initial net wealth
Marginal effects (*switch1*)

ITALY	(1)	(2)	(3)	(4)
age	-0.000516	-0.000810	-0.00397***	0.00114
	(0.00143)	(0.00146)	(0.00144)	(0.00247)
age^2	-5.09e-06	-3.67e-06	3.56e-05**	-2.72e-05
	(1.58e-05)	(1.60e-05)	(1.55e-05)	(3.05e-05)
education	-0.00170	-0.00198	-0.00151	-0.000751
	(0.00209)	(0.00209)	(0.00232)	(0.00243)
education^2	7.69e-05	7.73e-05	6.19e-05	4.75e-05
	(9.61e-05)	(9.77e-05)	(0.000101)	(0.000108)
male (dummy)	0.0124***	0.0104**	0.0130***	0.00761
	(0.00433)	(0.00446)	(0.00401)	(0.00523)
married (dummy)	-0.0137*	-0.0133*	-0.0177*	-0.0146*
	(0.00771)	(0.00784)	(0.0102)	(0.00885)
family size	-0.00138	-0.000670	0.00112	-0.00150
	(0.00217)	(0.00224)	(0.00197)	(0.00240)
parental education	0.000771	0.000724	0.000761	0.000346
	(0.000540)	(0.000556)	(0.000601)	(0.000542)
father entrepreneur	0.0279***	0.0277***	0.0164***	0.0244***
	(0.00570)	(0.00571)	(0.00557)	(0.00636)
net wealth / 100,000	0.00351***	0.00413***	0.00259**	0.00318***
	(0.000951)	(0.00114)	(0.00121)	(0.00113)
labour income / 100,000	-0.0940***		-0.106***	-0.0656*
	(0.0358)		(0.0361)	(0.0373)
unemployed	-0.0391***	-0.0554***	-0.0262**	-0.0427***
	(0.0106)	(0.0111)	(0.0122)	(0.0148)
previous experience as entrep.	0.0836**	0.0868**	0.0610	0.182**
	(0.0407)	(0.0403)	(0.0376)	(0.0778)
total income		-0.0247		
		(0.0162)		
risk aversion*net wealth			0.000285	
			(0.00711)	
Predicted prob.	0.0350	0.0350	0.0163	0.0336
Observed prob.	0.0248	0.0250	0.0295	0.0236
Pseudo R-squared	0.1099	0.1058	0.1594	0.1139
Observations	10349	10349	5063	7927

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Marginal effects(*switch1*)
US

	(1)	(2)	(3)	(4)
age	0.00131	0.000848	0.000992	0.00370**
	(0.00101)	(0.000991)	(0.00133)	(0.00168)
age^2	-1.67e-05	-1.13e-05	-7.34e-06	-4.98e-05**
	(1.16e-05)	(1.13e-05)	(1.51e-05)	(2.20e-05)
education	-0.00240	-0.00224	-0.000188	-0.00440
	(0.00254)	(0.00255)	(0.00316)	(0.00298)
education^2	0.000102	8.66e-05	2.97e-05	0.000176*
	(8.89e-05)	(8.90e-05)	(0.000109)	(0.000103)
male (dummy)	0.0128***	0.0122***	0.0139***	0.0112**
	(0.00441)	(0.00448)	(0.00510)	(0.00464)
married (dummy)	-0.00286	-0.00381	-0.0100	0.000543
	(0.00523)	(0.00532)	(0.00643)	(0.00545)
family size	0.000179	9.26e-05	0.00150	-0.000364
	(0.00138)	(0.00139)	(0.00162)	(0.00144)
parental education	0.000811*	0.000711	0.000815	0.000782
	(0.000456)	(0.000456)	(0.000542)	(0.000490)
father entrepreneur (dummy)	-0.000182	-0.000362	0.00558	-0.00189
	(0.00459)	(0.00459)	(0.00592)	(0.00507)
net wealth /100,000	0.00380***	0.00329***	0.00158	0.00438***
	(0.000863)	(0.000897)	(0.00158)	(0.00105)
labour income / 100,000	-0.0201*		-0.0250*	-0.0305**
	(0.0105)		(0.0135)	(0.0140)
unemployed (dummy)	-0.0135**	-0.0185***	-0.0315***	-0.0215**
	(0.00674)	(0.00663)	(0.0107)	(0.00842)
previous experience as entrep.	0.128**	0.134**	0.0544	0.0922
	(0.0643)	(0.0659)	(0.0632)	(0.0617)
total income/100,000		-0.00168		
		(0.00379)		
risk tolerance*net wealth			0.00822**	
			(0.00399)	
Observed prob.	0.0347	0.0347	0.0353	0.0341
Predicted prob.	0.0328	0.0331	0.0324	0.0318
Pseudo R-squared	0.0185	0.0162	0.0297	0.0225
Observations	11759	11759	8193	9937

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Notes: The dependent variable *(switch1)* takes value 1 if the household was wage earner at *t,* and he becomes entrepreneur at *t+2* . Year dummies are included. Personal characteristics refer to household head. In specification (II) total income - calculated as the sum of labour income, asset income and transfers - is included instead of labour income. Specification (III) includes risk aversion (Italy) and risk tolerance (US). In specification (IV) only household heads whose age is below 55 years old are considered. All nominal variables are deflated using 2003 consumer price index.

Table 5.2 The probability to start a business and initial net wealth
Marginal effects (*switch2*)

ITALY	(1)	(2)	(3)	(4)
age	0.00150	-0.000965	-0.00330	-0.00501
	(0.00288)	(0.00326)	(0.00357)	(0.00498)
age^2	-2.27e-05	-7.51e-06	2.22e-05	6.20e-05
	(3.19e-05)	(3.62e-05)	(3.88e-05)	(6.22e-05)
male (dummy)	0.0310***	0.0260***	0.0326***	0.0359***
	(0.00786)	(0.00930)	(0.00906)	(0.00832)
married (dummy)	0.00122	-0.0130	-0.000588	0.00918
	(0.0123)	(0.0153)	(0.0152)	(0.0126)
education	-0.00189	-0.00623	-0.00891**	-0.00690
	(0.00405)	(0.00423)	(0.00450)	(0.00499)
education^2	0.000140	0.000200	0.000362*	0.000381
	(0.000192)	(0.000196)	(0.000207)	(0.000231)
family size	0.00623*	0.00874**	0.00522	0.00310
	(0.00348)	(0.00417)	(0.00381)	(0.00410)
parental education	0.00181*	0.00123	0.00167	0.000797
	(0.000939)	(0.00110)	(0.00110)	(0.00106)
father entrepreneur	0.0644***	0.0695***	0.0692***	0.0703***
	(0.0118)	(0.0122)	(0.0143)	(0.0139)
net wealth	0.0129***	0.0123***	0.0127***	0.0159***
	(0.00183)	(0.00220)	(0.00240)	(0.00232)
labour income	-0.581***		-0.522***	-0.612***
	(0.0596)		(0.0712)	(0.0728)
unemployed	-0.0231**	0.00859	-0.0216*	-0.0253**
	(0.00939)	(0.0135)	(0.0123)	(0.0118)
previous experience as entrep.	0.0732	0.209**	0.0235	0.168*
	(0.0532)	(0.0838)	(0.0404)	(0.0972)
total income		0.0295		
		(0.0288)		
risk*net wealth			0.00322	
			(0.0136)	
Observed prob.	0.0799	0.0799	0.0768	0.0834
Predicted prob.	0.0558	0.0671	0.0502	0.0576
Pseudo R-squared	0.1563	0.0769	0.1687	0.1667
Observations	6726	6726	3931	5195

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Marginal effect *(switch2)*
US

	(1)	(2)	(3)	(4)
age	0.000255	-4.86e-05	-0.00120	0.00110
	(0.00115)	(0.00114)	(0.00164)	(0.00200)
age^2	-3.96e-07	2.40e-06	2.05e-05	-1.16e-05
	(1.32e-05)	(1.32e-05)	(1.89e-05)	(2.61e-05)
education	0.00331	0.00316	0.00902*	0.00571
	(0.00304)	(0.00304)	(0.00476)	(0.00370)
education^2	-5.71e-05	-6.32e-05	-0.000236	-0.000136
	(0.000104)	(0.000104)	(0.000159)	(0.000125)
male (dummy)	0.0475***	0.0468***	0.0510***	0.0472***
	(0.00445)	(0.00447)	(0.00588)	(0.00486)
married (dummy)	0.00513	0.00323	0.00118	0.00450
	(0.00566)	(0.00571)	(0.00773)	(0.00620)
family size	0.000505	0.000372	0.00141	0.000275
	(0.00154)	(0.00154)	(0.00213)	(0.00169)
parental education	0.00235***	0.00225***	0.00176***	0.00249***
	(0.000497)	(0.000497)	(0.000643)	(0.000551)
father entrep.	0.0195***	0.0196***	0.0212**	0.0182***
	(0.00632)	(0.00632)	(0.00853)	(0.00696)
net wealth / 100,000	0.000579	0.000445	-0.00147	0.000594
	(0.000362)	(0.000315)	(0.00141)	(0.000433)
labour income	-.0024032		0 .000458	0 .0017658
	(0 .0061111)		(0 .0089158)	(0 .006751)
unemployed	-0.0274***	-0.0261***	-0.0274***	-0.0278***
	(0.00500)	(0.00502)	(0.00778)	(0.00609)
previous experience as entrep.	0.164***	0.167***	0.196***	0.173***
	(0.0516)	(0.0519)	(0.0661)	(0.0616)
total income		0 .008558***		
		(0 .0032676)		
risk tolerance*net wealth			0.00718	
			(0.00492)	
Observed prob.	0.0624	0.0624	0.0698	0.0637
Predicted prob.	0.0518	0.0517	0.0608	0.0533
R-squared	0.0544	0.0552	0.0451	0.0520
Observations	13823	13823	9485	11842

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Notes: The dependent variable *(switch2)* takes value 1 if the household was wage earner at *t,* and he becomes entrepreneur at *t+4* (Italy) or *t+5* (US). Year dummies are included. Personal charachteristics refer to household head. In specification (II) total income - calculated as the sum of labour income, asset income and transfers - is included instead of labour income. Specification (III) includes risk tolerance. In specification (IV) only household head whose age is below 55 years old are considered. All nominal variables are deflated using 2003 consumer price index.

Table 6.1 The probability to start a business- some exercises.
Marginal effects
ITALY

	(1)	(2)	(3)	(4)
	switch1	*switch2*	*switch1*	*switch2*
age	-0.00135	-0.00501*	-0.00133	-0.00146
	(0.00138)	(0.00260)	(0.00177)	(0.00357)
age^2	2.13e-06	5.60e-05**	1.53e-06	1.72e-05
	(1.51e-05)	(2.81e-05)	(1.93e-05)	(3.91e-05)
education	-0.00320*	-0.00382	-0.00297	0.00136
	(0.00194)	(0.00351)	(0.00232)	(0.00547)
education^2	0.000132	0.000159	0.000144	4.75e-07
	(8.83e-05)	(0.000162)	(0.000108)	(0.000252)
male (dummy)	0.0113***	0.0251***	0.0101**	0.0184*
	(0.00415)	(0.00729)	(0.00481)	(0.0105)
married (dummy)	-0.0135*	-0.000206	-0.00314	6.77e-05
	(0.00759)	(0.0115)	(0.00728)	(0.0160)
family size	-0.000167	0.00656**	-0.000557	0.00939**
	(0.00203)	(0.00323)	(0.00251)	(0.00469)
parental education	0.000729	0.00118	0.000537	0.00197*
	(0.000533)	(0.000842)	(0.000583)	(0.00118)
father entrepreneur	0.0314***	0.0637***	0.0350***	0.0692***
	(0.00574)	(0.0108)	(0.00759)	(0.0164)
unemployed	-0.0573***	0.0329***	-0.0496***	0.0176
	(0.0104)	(0.00864)	(0.0114)	(0.0121)
II wealth quartile	0.00411	0.0151	0.00453	0.0157
	(0.00654)	(0.00990)	(0.00864)	(0.0140)
III wealth quartile	0.00533	0.0254**	0.00437	0.0205
	(0.00657)	(0.0120)	(0.00801)	(0.0164)
IV wealth quartile	0.0100	0.0250*	0.00762	0.00662
	(0.00732)	(0.0131)	(0.00899)	(0.0165)
constrained	-0.00140	-0.279***	0.163	-0.565***
	(0.00737)	(0.0244)	(0.162)	(0.137)
no_help*constrained			-0.0298***	0.0649***
			(0.00557)	(0.0141)
Observed prob.	0.0344	0.0758	0.0358	0.0787
Predicted prob.	0.0252	0.0504	0.0249	0.0561
Pseudo R-squared	0.0912	0.1840	0.1048	0.1446
Observations	10349	6726	7129	4152

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Marginal effect
US

	(1)	*(2)*	*(3)*	*(4)*
	switch1	*switch2*	*switch1*	*switch2*
age	0.000610	-0.00102	0.000683	-0.00147
	(0.000992)	(0.00114)	(0.000990)	(0.00122)
age^2	-8.65e-06	6.48e-06	-9.32e-06	1.10e-05
	(1.13e-05)	(1.31e-05)	(1.12e-05)	(1.38e-05)
education	-0.00298	0.000822	-0.00298	0.000595
	(0.00252)	(0.00297)	(0.00252)	(0.00304)
education^2	0.000113	-4.51e-06	0.000112	3.33e-06
	(8.75e-05)	(0.000101)	(8.75e-05)	(0.000103)
male (dummy)	0.0121***	0.0439***	0.0121***	0.0432***
	(0.00451)	(0.00448)	(0.00450)	(0.00467)
married (dummy)	-0.00240	-0.00397	-0.00230	-0.00440
	(0.00543)	(0.00583)	(0.00543)	(0.00605)
family size	0.000317	0.00102	0.000294	0.00107
	(0.00140)	(0.00153)	(0.00139)	(0.00157)
parental education	0.000990**	0.00209***	0.000985**	0.00203***
	(0.000453)	(0.000490)	(0.000453)	(0.000503)
father entrep.	0.00209	0.0186***	0.00216	0.0192***
	(0.00468)	(0.00619)	(0.00468)	(0.00636)
II wealth quartile	-0.00957**	0.0126*	-0.00921*	0.0151**
	(0.00466)	(0.00700)	(0.00473)	(0.00732)
III wealth quartile	-0.00743	0.0299***	-0.00706	0.0323***
	(0.00515)	(0.00845)	(0.00521)	(0.00877)
IV wealth quartile	0.00609	0.0643***	0.00644	0.0685***
	(0.00655)	(0.0121)	(0.00663)	(0.0125)
unemployed	-0.0171***	0.0254***	-0.0170***	0.0259***
	(0.00639)	(0.00502)	(0.00638)	(0.00520)
	(0.0689)	(0.0506)	(0.0689)	(0.0512)
constrained	-0.0168*	-0.00341	-0.0111	0.00158
	(0.00891)	(0.00970)	(0.0117)	(0.0121)
no_help*constrained			-0.00618	0.00149
			(0.00740)	(0.0230)
Observed prob.	0.0347	0.0624	0.0355	0.0632
Predicted prob.	0.0249	0.0502	0.0334	0.0515
Pseudo R-squared	0.1016	0.0640	0.0191	0.0616
Observations	11759	13823	11944	13410

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Notes: Wealth-quartiles dummies and year dummies. Specification (1) and (2) includes a dummy (*constrained*) which takes value 1 if the household is liquidity constrained, and 0 otherwise. An household is considered constrained if total net wealth is lower than two months' income. Specification (3) and (4) includes the interaction term between *no_help* and *constrained. no_help* takes value 1 if the household did not receive any help from parents or friends the period before switching to entrepreneurship. All nominal variables are deflated using 2003 consumer price index.

Table 6.2 The probability to start a business including the financial diversification index.

ITALY

	(1)	(2)	(3)	(4)
	switch1	*switch2*	*switch1-IV*	*switch2-IV*
age	-0.00660***	0.000527	-0.0921***	-0.0467***
	(0.00172)	(0.00231)	(0.0150)	(0.0148)
age	6.37e-05***	-7.15e-06	0.000780***	0.000375**
	(1.76e-05)	(2.41e-05)	(0.000153)	(0.000156)
male (dummy)	0.00892	0.0298***	0.234***	0.153**
	(0.00726)	(0.00786)	(0.0781)	(0.0636)
married (dummy)	-0.0218*	-0.00474	-0.144	-0.0106
	(0.0119)	(0.0127)	(0.0927)	(0.0797)
education	-0.00438	-0.00338		
	(0.00286)	(0.00412)		
education^2	0.000174	0.000211		
	(0.000136)	(0.000195)		
family size	0.000891	0.00896**	0.00275	0.0502**
	(0.00262)	(0.00368)	(0.0302)	(0.0239)
parental education	0.000529	0.00160*		
	(0.000891)	(0.000951)		
father job	0.0436***	0.0593***	0.401***	0.346***
	(0.00937)	(0.0117)	(0.0618)	(0.0502)
labour income/100,000	-0.206***	-0.574***		
	(0.0606)	(0.0562)		
net wealth/100,000	0.007081***	0.001210***	0.006516***	0.008344***
	(135.6)	(183.3)	(1397)	(1120)
fin. diversification index	0.00602	0.000782	-0.773	-0.572
	(0.0165)	(0.0207)	(0.896)	(0.705)
unemployed	-0.0115	-0.0325***	0.593***	0.0367
	(0.00773)	(0.00795)	(0.0779)	(0.0717)
Wald test exogeneity			0.3266	0.4636
Observations	6804	6726	6804	6726

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

US	*(1)* *switch1*	*(2)* *switch2*	*(3)* *switch1- IV*	*(4)* *switch2 - IV*
age	0.00218	-0.000212	-0.0186	-0.0283
	(0.00141)	(0.00164)	(0.0203)	(0.0177)
age^2	-2.61e-05*	-1.17e-05	4.46e-06	8.92e-05
	(1.55e-05)	(1.87e-05)	(0.000194)	(0.000174)
education	0.00226	-0.00623		
	(0.00362)	(0.00415)		
education^2	-9.36e-05	0.000196		
	(0.000124)	(0.000144)		
male (dummy)	0.0320***	0.0530***	0.303***	0.532***
	(0.00618)	(0.00640)	(0.106)	(0.108)
married (dummy)	-0.0138	-0.00292	-0.422***	-0.200*
	(0.00866)	(0.00876)	(0.145)	(0.115)
family size	-0.000507	0.00127	0.0758*	0.0629*
	(0.00213)	(0.00231)	(0.0433)	(0.0355)
parental education	0.00329***	0.00295***		
	(0.000699)	(0.000757)		
father entrep.	0.0113	0.0211**	0.0392	0.126*
	(0.00753)	(0.00843)	(0.0739)	(0.0648)
labour income / 100,000	0.00812	-0.0224	-0.4004*	-0.47758**
	(0.0131)	(0-0138)	(0.24115)	(0.19184)
net wealth / 100,000	0.00488***	0.0101***	-0.1750*	-0.0671
	(0.00161)	(0.00181)	(0.0934)	(0.0788)
fin.diversification index	0.0150	0.0656***	4.590***	3.409**
	(0.0133)	(0.0141)	(1.782)	(1.431)
unemployed	0.0306**	-0.0187**	0.219**	-0.197*
	(0.0125)	(0.00943)	(0.0976)	(0.103)
Wald test of exogeneity			0.0081	0.0411
Observations	7377	7425	7377	7425

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Notes: Year dummies are included. In column (3) and (4) household head years of education, and level of education of household head's father are used as instruments for financial diversification index.

Table 6.3 IV estimation
switch2

	ITALY	**US**
	(I)	(III)
fin. divers. index	2.070378	3.840**
	(2.223696)	(1.785)
net wealth / 100000	0.1871222***	-0.0217
	(0.0522728)	(0.00103)
age	0.0114977	-0.0265
	(0.0720137)	(0.0260)
age^2	-.0002443	6.75e-05
	(0.000765)	(0.000261)
male (dummy)	0.1523589	0.299*
	(0.1875501)	(0.163)
married (dummy)	-.1158506	-0.128
	(0.2350364)	(0.180)
family size	0.0474394	0.0797
	(0.0722495)	(0.0488)
father entrepreneur	.4247815**	0.0378
	(0.1720321)	(0.107)
unemployed		-0.503***
		(0.152)
labour income	-5.814392***	-6.73e-06***
	(1.1601)	(2.16e-06)
Constant	-2.552225	-2.074***
	(1.528798)	(0.535)

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Notes: Year dummies are included. In column (II) household head years of education, and level of education of household head's father are used as instruments for financial diversification index.

Table 7. Wealth accumulation and the probability to start a business
Switching regression ITALY

	switch1			switch2		
	(I)	(II)	(III)	(I)	(II)	(III)
VARIABLES	ΔW^1	ΔW^0	select	ΔW^1	ΔW^0	select
II wealth quartile	0.602***	0.555	0.111	0.654***	0.799***	0.450***
	(0.0653)	(0.380)	(0.112)	(0.0696)	(0.269)	(0.0711)
III wealth quartile	0.632***	0.977**	0.0891	0.614***	1.348***	0.333***
	(0.0709)	(0.409)	(0.134)	(0.0765)	(0.272)	(0.0824)
IV wealth quartile	0.804***	0.725	0.257	0.866***	1.353***	0.388***
	(0.0845)	(0.485)	(0.166)	(0.0942)	(0.334)	(0.101)
unemployed (dummy)	-0.0980	-1.048**	-0.720***	-0.168*	-0.319	0.0985
	(0.0771)	(0.453)	(0.111)	(0.0868)	(0.250)	(0.104)
fin. div. index	-0.153	0.443	-0.0302	-0.130	0.578	-0.0972
	(0.135)	(0.811)	(0.232)	(0.149)	(0.528)	(0.152)
age	-0.0158	0.0568	-0.0964***	-0.0279	-0.0446	-0.0640***
	(0.0207)	(0.0988)	(0.0278)	(0.0227)	(0.0720)	(0.0241)
age^2	0.000205	-0.000509	0.000800***	0.000286	0.000609	0.000574**
	(0.000225)	(0.00103)	(0.000304)	(0.000247)	(0.000805)	(0.000264)
male (dummy)	-0.0792	0.828**	0.246**	-0.0887	0.138	0.00119
	(0.0594)	(0.395)	(0.108)	(0.0651)	(0.221)	(0.0684)
married (dummy)	0.0510	-0.289	-0.177	0.0800	-0.374	0.161
	(0.0797)	(0.348)	(0.121)	(0.0852)	(0.322)	(0.0989)
education	0.0566**	-0.113	-0.0690*	0.0321	0.158	-0.0693**
	(0.0276)	(0.146)	(0.0415)	(0.0310)	(0.108)	(0.0304)
education^2	-0.00102	0.00327	0.00256	-4.82e-05	-0.00531	0.00244*
	(0.00120)	(0.00640)	(0.00191)	(0.00135)	(0.00453)	(0.00136)
	(0.0507)	(0.277)	(0.0890)	(0.0561)	(0.195)	(0.0594)
family size	-0.0601**	-0.0481	0.00265	-0.0432	0.123	0.000341
	(0.0245)	(0.112)	(0.0409)	(0.0272)	(0.0877)	(0.0298)
parental education			-0.0137			-0.00228
			(0.0119)			(0.00676)
father entrepreneur (dummy)			0.453***			0.145***
			(0.0868)			(0.0486)
family income			0.480			1.316***
			(0.402)			(0.175)
Constant	11.88***	10.02***	1.284**	12.25***	9.994***	0.00109

	(0.469)	(1.990)	(0.651)	(0.510)	(1.597)	(0.520)
Rho0	-0.1142 (0.0889)			0.9217*** (0.0216)		
Rho1	0.6325*** (0.2121)			0.4784*** (0.1038)		
Wald test of indep.eq. Prob > chi2	0.0001			0.0000		
Observations	4234	4234	4234	4229	4229	4229

Robust standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Switching regression US						
	switch1			switch2		
VARIABLES	(I) ΔW^1	(II) ΔW^0	(III) select	(I) ΔW^1	(II) ΔW^0	(III) select
II wealth quartile	0.237***	-0.456	-0.0461	0.196***	-0.347	0.321***
	(0.0666)	(0.534)	(0.107)	(0.0682)	(0.534)	(0.0996)
III wealth quartile	0.527***	-0.266	0.310***	0.492***	-0.178	0.517***
	(0.0749)	(0.550)	(0.113)	(0.0811)	(0.589)	(0.110)
IV wealth quartile	0.829***	-0.316	0.534***	0.858***	-0.417	0.682***
	(0.0929)	(0.766)	(0.140)	(0.107)	(0.695)	(0.149)
unemployed	-0.282***	0.282	-0.430***	-0.251***	-0.791	0.0142
	(0.0971)	(0.489)	(0.118)	(0.0949)	(0.604)	(0.128)
fin. div. index	0.209*	-0.0199	-0.0180	0.111	0.240	0.247
	(0.123)	(0.648)	(0.181)	(0.124)	(0.543)	(0.171)
age	-0.0380***	-0.103	0.0171	-0.0360***	0.00233	-0.0219
	(0.0123)	(0.0826)	(0.0191)	(0.0130)	(0.0635)	(0.0193)
age^2	0.000405***	0.00143	-0.000328	0.000404***	4.86e-05	6.96e-05
	(0.000139)	(0.000887)	(0.000213)	(0.000142)	(0.000723)	(0.000220)
education	-0.0186	-0.0698	-0.0431	-0.0331	0.0122	-0.101**
	(0.0339)	(0.234)	(0.0458)	(0.0356)	(0.124)	(0.0428)
education^2	0.00130	0.00352	0.00101	0.00188	0.000711	0.00303**
	(0.00115)	(0.00775)	(0.00154)	(0.00120)	(0.00419)	(0.00146)
male (dummy)	0.0274	-0.480	0.561***	0.0372	0.0517	0.537***
	(0.0833)	(0.903)	(0.135)	(0.0842)	(0.699)	(0.126)
married	-0.143*	-0.550	-0.163	-0.158**	-0.787**	-0.151
	(0.0748)	(0.418)	(0.0999)	(0.0752)	(0.319)	(0.0926)
family size	-0.0947***	0.111	-0.00720	-0.101***	0.121	0.0378
	(0.0190)	(0.0894)	(0.0276)	(0.0191)	(0.0872)	(0.0256)
family income			-7.22e-07			-7.93e-07
			(1.17e-06)			(2.10e-06)
parental education			0.0241***			0.0245***
			(0.00759)			(0.00792)
father entrepreneur (dummy)			0.185**			0.188**
			(0.0745)			(0.0757)
Constant	0.587*	6.610*	-1.625***	0.715*	2.155	-1.245**
	(0.353)	(3.693)	(0.530)	(0.406)	(1.996)	(0.535)
Rho0	-0.1650***			-0.2186***		
	(0.0575)			(0.0862)		

Rho1	-0.8031***			-0.44404		
	(0.1692)			(0.3644)		
Wald test of indep. eq.						
Prob > chi2	0.0066			0.0362		
Observations	4490	4490	4490	4496	4496	4496
Robust standard errors in parentheses						
*** p < 0.01, ** p < 0.05, * p < 0.1						

Notes: This table show estimation of equations (6.1), (6.2) and (6.3). All nominal variables are deflated using 2003 consumer price index. In columns (I) and (II) the dependent variable is the log change in net wealth, normalized by household income as of time t-4 (Italy) or t-5 (US), for wage earners and switching entrepreneurs, respectively. In the probit equation (column III) those who switch to entrepreneurship according to *switch1* and *switch2* are considered. Estimation of equations (6.1) (6.2) and (6.3) is implemented through maximum likelihood.