HOUSEHOLD WEALTH AND ENTREPRENEURSHIP: IS THERE A LINK?

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Abstract

In the absence of correlation between net wealth and entrepreneurial talent or risk aversion, net wealth should have an explanatory power in the decision of becoming entrepreneurs only for households that are financially constrained. Further, the importance of net wealth should be higher for the poorest households. We test these theoretical predictions for the Italian case, using the Survey of Household Income and Wealth. The evidence is that household initial net wealth is relevant in explaining the decision of becoming entrepreneurs and its relevance is decreasing as far as the household net wealth increases. When instrumented, net wealth still explains the occupational choice, with a more important effect for the households in the first two quartiles of net wealth. As expected, net wealth is also more relevant for the households that are totally or partially turned down by a bank when they apply for a loan. The effect of net wealth is also stronger when legal enforcement of the loan contract is worse. Finally, conditional on becoming entrepreneurs, the initial net wealth does not significantly affect the size of the business. In summary, it seems that imperfections in capital markets can induce people to pile up assets in order to facilitate the decision of becoming entrepreneurs. However, conditional on this decision, the entrepreneurs seem to reach the optimal size of the business.

JEL CLASSIFICATION: entrepreneurship, business start-up, wealthy households.

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Contents

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1. Introduction[1]

Entrepreneurs hold a high share of total net wealth. This evidence is widely documented in the US (Quadrini, 1999; Gentry and Hubbard, 2000) and is true in Italy as well (Table 1a). Several stories can provide an explanation for this evidence. Being entrepreneurs can be at the origin of an increasing wealth. On the other hand, a higher initial wealth may facilitate the decision of becoming entrepreneurs.

The aim of this paper is to study the potential connection between household initial wealth and entrepreneurship for the Italian case and to dwell on its related explanations. Why should initial net wealth be linked to the probability of becoming entrepreneur? Theoretical models of occupational choices predict that if net wealth and entrepreneurial ability were not correlated *and* capital market were perfect, initial net wealth should not be linked to the decision of becoming entrepreneur (Section 2). On the contrary, when would-be entrepreneurs face some imperfections in capital markets, taking on the form of financial constraints, *and* initial capital requirements are not trivial**,** we should observe a correlation between initial net wealth and the entrepreneurial income. As a consequence, the probability of becoming entrepreneurs is also correlated with household initial net wealth.

The theoretical framework under this debate is quite old. The theory developed by Knight at the onset of the past century (see LeRoy and Singell, 1987) supports the view that a person has to be wealthy before starting a business. The high uncertainty correlated with the entrepreneurial activity causes market failures in providing the entrepreneur with all the money he requires. Therefore the entrepreneur needs also to be a capitalist. On the contrary, according to Schumpeter (1934) entrepreneur and capitalist are two distinct functions. Therefore, Schumpeter focuses on the entrepreneurial ability as the main prerequisite to become entrepreneurs, rather than on low risk aversion more emphasised by Knight.

From an empirical perspective, several contributions find evidence that net wealth is important in determining the probability of becoming entrepreneurs and the entrepreneurial

[1] I wish to thank for their helpful comments Riccardo De Bonis, Luigi Federico Signorini, and seminar participants at the 10th Annual Meeting of Lacea (Paris, October 2005).

income (Evans and Jovanovic, 1989; Evans and Leighton, 1989; Fairlie, 1999; Gentry and Hubbard, 2000). This is also true when the endogeneity problem of the household wealth is tackled, generally using inheritances as instruments for wealth or as a more exogenous substitute directly in the estimation (Holtz-Eakin et al, 1994a and 1994b; Blanchflower and Oswald, 1998**)**. Even in the US and in the UK, financial constraints seem therefore affect the birth of sole proprietorship. On the contrary, Hurst and Lusardi (2004), using the Panel Study of Income Dynamics, find that in the US the relationship between initial net wealth and the entry into entrepreneurship is flat for most of the distribution of net wealth. This relationship becomes positive and significant only at the top of the wealth distribution.[2] Hurst and Lusardi (2004) argue that this evidence is at odds with an explanation based on financial constraints. Even if some constraints exist, they do not appear to be empirically important in deterring the birth of most of the US businesses, probably because the capital required for starting a business is generally small[3] and loans are widespread among entrepreneurs. To further explain their results, the authors reckon that households at the top of the wealth distribution are far more likely to start a business in the professional industry. Further, the very wealthy households are more likely to have lower risk aversion and therefore are more willing to bear the high uncertainty that entrepreneurial activity entails.

Actually, the main problem of the theoretical models analysing the occupational choice of becoming entrepreneur is that their implications are obtained assuming *no* correlation between net wealth and the entrepreneurial talent; a similar consideration holds for risk aversion, which is even not considered in these models. Because both entrepreneurial talent and risk aversion are unobserved, a shock in these unobserved factors might influence both the decision of becoming entrepreneurs and the (endogenous) net wealth. In this case, you can find a spurious correlation

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[2] The authors estimate a probit model for the decision of becoming entrepreneur by including wealth dummies (three groups: below the 80 percentile of net wealth, between the 80 and the 95, above the 95 percentile). Hence, they allow a shift in the intercept of the estimated probability model. They find that the probability of becoming entrepreneur for households in the bottom 80 per cent is 2.9 per cent. This probability increases sharply only for those in the top 5 per cent of the wealth distribution; these households are 3.8 percentage points more likely to start a business.

[3] On this point see also Meyer (1990). However, Gentry and Hubbard (2000) share a different view: they compare household net wealth and the median entrepreneurial equity stake and conclude that most households do require external financing to start a business. They argue that costly external financing may play a role for entering entrepreneurship at all levels of wealth.

between net wealth and entrepreneurship, which is actually driven by a third unobserved factor (talent and/or risk aversion). This is a very general problem that springs from the endogeneity of net wealth.

In this paper we try to improve on this point. Bringing some evidence for Italy, which is rich in sole proprietorships, we use data from the Survey of Households Income and Wealth (SHIW). The SHIW has information that allows us to control for household entrepreneurial ability and risk aversion better. Further, the SHIW provides us with an indicator of household credit rationing, which can help in disentangling the different explanations of the relevance of wealth for the would-be entrepreneurs. Finally, information is available on the value of the business and the number of employees in the firm. Hence, we find it possible to verify the impact of initial net wealth on the size of the firm as well, an issue less explored by previous empirical contributions due to data limitations. Beyond these features connected to the SHIW, in this paper we do not just allow in the estimation the possibility of a shift in the intercept for different levels of net wealth as in Hurst and Lusardi (2004, see footnote 1). We go a step forward by allowing the coefficient of net wealth as well to be different for households belonging to different quartiles of net wealth. These are the main contributions of the paper.

The results found are that, after controlling for an informal way of learning entrepreneurial ability, initial net wealth is quite important in explaining the probability of would-be entrepreneurs; further, its relevance decreases with the quartiles of net wealth, as predicted by the model. Using other controls for entrepreneurial talent and risk aversion, which considerably reduce the number of observations, the evidence is similar. When instrumented with past inheritances and transfers, initial net wealth has actually a positive and higher impact for households belonging to the first two quartiles of net wealth; its coefficient retains a positive sign for the richest household as well (fourth quartile of net wealth), for which is nonetheless lower. Moreover, net wealth is more important for rationed households and for those that live in regions with worse legal enforcement. Referring to the impact on the size of the business, conditional on becoming entrepreneurs, net wealth has actually no or limited effect.

The paper proceeds as follows. In the following section a simple theoretical model is developed to help in fixing the idea about the predictions we are going to test in subsequent sections. Section 3 presents the data and the empirical variables used to test the predictions. Section 4 contains the estimation aimed at shedding light on the link between household initial

net wealth and the decision to become entrepreneurs. In Section 5 some further exercises are presented. Section 6 shows the results of the estimation on the link between initial net wealth and the business size. Section 7 presents some alternative specifications. Section 8 concludes with some final remarks.

2. A model of entrepreneurial selection with incomplete enforcement

To fix the ideas on the theoretical predictions tested in the paper, we rely on a simple model similar to the one developed in Evans and Jovanovic (1989) and in Holtz-Eakin et al. (1994a).[4] However, we add a number of features. Firstly, entrepreneurs can default[5]; further, there is limited enforceability of the loan contract that is actually at the origin of the credit constraint; finally, the parameter of credit rationing is not equal for all households as in Evans and Jovanovic (1989) and it varies with household wealth and legal enforcement. These small changes in the model make it easier to interpret the results presented in the following sections.

In this static model of occupational choice, the household is the unit of analysis principally because net wealth is measured at a family level; further, frequently business is a family business, where all or most of the members of the household work in the same firm. The household compares the income that can be obtained as a wage earner with the income as entrepreneur and then selects the occupation. For the wage earner the income is given by

$$Y^w = \mu x_1^{\gamma_1} x_2^{\gamma_2} \eta \qquad (1)$$

i.e., wage income depends on the previous experience as a wage worker x_1, on the education x_2 and on a constant μ; η is a disturbance that is i.i.d. $(1, \sigma_\eta^2)$.

The entrepreneurial income is represented in the following way:

$$Y^e = \theta k^\alpha \varepsilon \qquad (2)$$

[4] In both these models the imperfection in the capital market takes on the form of a quantity constraint. In the model developed in Gentry and Hubbard (2000) the capital market imperfection takes on the form of a premium cost on external finance.

It depends on the entrepreneurial talent θ and on the capital invested in the production function k; $\alpha \in (0,1)$ and ε is a normal disturbance $(1, \sigma_\varepsilon^2)$ whose distribution is independent across workers.

First, we obtain the optimal capital for the entrepreneur, i.e. the capital maximising the expected value of the net entrepreneurial income (expectations are taken over ε)

$$\max_k E\{\theta k^\alpha \varepsilon + r(A - k\} \tag{3}$$

where A is the household wealth endowment and r is the interest rate at which household can either lend and borrow in the credit market.

The optimal capital for the unconstrained household equals the marginal product of the capital to the interest rate in the first order condition and therefore:

$$k^* = \left(\frac{\alpha\theta}{r}\right)^{\frac{1}{1-\alpha}} \tag{4}$$

However, in the credit market there is a constraint on the maximum amount the bank is willing to lend to the borrower. Stiglitz and Weiss (1981) show how credit rationing can arise even in a world in which all agents are optimising, but there is adverse selection and moral hazard problems arising from the existence of asymmetric information.[6] In more detail, in the model developed in this section, borrowing constraints stem from the assumptions that contracts are imperfectly enforceable (Caggetti and De Nardi, 2003). Imperfect enforceability of the loan contract implies that lenders will not be able to force the debtors to fully repay their loan. Debtors fully repay only whether it is in their own interest to do so. Since both the bank and the debtor are aware of this and act rationally, the lender will give a borrower only an amount, possibly equal to zero, which will be in the debtor's interest to repay as promised. In this model the amount of the

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[5] Evans and Jovanovic (1989) argue that if people are limited in the amount they can borrow, it is not unreasonable to assume they will not default.

[6] In Stiglitz and Weiss model the borrowing constraint takes the form of a quantity constraints rather than an increase in the borrowing interest rate, because the bank return is not motonically increasing with the price of the loan. Banks may rationally avoid finding an equilibrium on the credit market through the interest rate, since an increase in the price of the credit might attract the riskiest customers (adverse selection) or induce customers to choose the projects with the greatest return variability (moral hazard).

loan granted by the lender depends positively on the household wealth that can be pledged as collateral: the higher is the amount of household wealth invested in the business, the larger is the sum that the bank is able to recover. The amount of the loan is also positively linked to the degree of the enforceability of the loan contract (Caggetti and De Nardi, 2003).

The amount of the loan granted by the bank is consequently equal to

(5) $$\lambda = \lambda(A, J)$$

and, as mentioned, is positively linked to the household wealth A and to the enforcement of the loan contract J. Hence, for a household that is financially constrained in the credit market the maximum amount the entrepreneur is able to invest is equal to its wealth plus the loan:

(6) $$k^* = A + \lambda(A, J)$$

If $\lambda = 0$ the household is completely rationed in the credit market, while if $\lambda = \infty$ there is no imperfection in the capital market. The following assumptions on λ are supposed to hold: $\lambda_A > 0$, $\lambda_J > 0$, $\lambda_{AJ} < 0$, $\lambda_{AA} < 0$. The first two assumptions reflect the positive link between the amount of the loan with the household wealth and the enforceability of the contract; the third assumption states that the importance of the collateral decreases as the legal enforcement improves (i.e. collateral and enforcement are substitutes); the fourth assumption implies that the positive marginal effect of net wealth on the amount of the loan decreases with net wealth.

In summary, in this model the optimal capital that entrepreneurs can invest in their production function is equal to the minimum between these two quantities

(7) $$k^* = \min\left[\left(\frac{\theta\alpha}{r}\right)^{\frac{1}{1-\alpha}}; A + \lambda(A, J)\right]$$

The first amount is the optimal capital for households that are not financially constrained, while the second is for constrained households. The first implication of this model is that for households that are not credit constrained, the optimal capital is not affected by net wealth. The optimal capital is increasing in net wealth only for households that are financially constrained.

Further, as the optimal capital for unconstrained household is increasing in the entrepreneurial ability θ (see equation 4), when this ability is lower than a threshold, i.e., when

$$\theta \leq \frac{r}{a}\left[A + \lambda(A,J)\right]^{1-\alpha} \tag{8}$$

then the household is never constrained. The amount required for the optimal capital is completely covered by the household endowment of money.

Including the optimal capital in the production function (2), we obtain the entrepreneurial earnings under the two cases of unconstrained and constrained households.

$$Y = \begin{cases} \theta^{\frac{1}{1-\alpha}}\left(\frac{a}{r}\right)^{\frac{\alpha}{1-\alpha}}\varepsilon \\ \theta\left[A + \lambda(A,J)\right]^{\alpha}\varepsilon \end{cases} \tag{9}$$

Given entrepreneurial ability or, in other words, controlling for entrepreneurial ability θ, the partial derivatives of income with respect to the household net wealth for unconstrained and constrained households are:

$$\left.\frac{\partial Y}{\partial A}\right|\bar{\theta} = \begin{cases} 0 \\ \theta\alpha\left[A + \lambda(A,J)\right]^{\alpha-1}\left(1 + \lambda_A\right) \end{cases} \tag{10}$$

Therefore, one of the predictions of this model is that household initial net wealth can influence the entrepreneurial income through the optimal capital only for financially constrained households.

Further, as net wealth increases, it has a decreasing positive impact on entrepreneurial earnings:

$$\frac{\partial^2 Y}{\partial A^2} = \theta\alpha\left\{(\alpha-1)\left[A + \lambda(A,J)\right]^{\alpha-2}(1+\lambda_A)^2 + \lambda_{AA}\left[A + \lambda(A,J)\right]^{\alpha-1}\right\} \tag{11}$$

This second derivative has a negative sign as the first term is negative ($\alpha < 1$) and the second as well because $\lambda_{AA} < 0$ by assumption, i.e., as net wealth increases, the importance of an increase in the net wealth for the amount of the loan decreases.

After determining entrepreneurial income in the two positions (constrained and unconstrained), the household selects the occupation by comparing wage income with entrepreneurial income. The household knows its ability θ[7] and will choose to start a business if and only if its expected net income is greater than wage earning

$$\max\left[\theta k^{\alpha} + r(A-k)\right] \geq \mu x_1^{\gamma_1} x_2^{\gamma 2} + rA \tag{12}$$

For unconstrained households we substitute the optimal capital into (12) and we get (see the Appendix point 1 for details):

$$\mu^{1-\alpha}(1-\alpha)^{\alpha-1}\left(\frac{r}{\alpha}\right)^{\alpha}(x_1^{\gamma_1}x_2^{\gamma_2})^{1-\alpha} \leq \theta \leq \left(\frac{r}{\alpha}\right)\left[A+\lambda(A,J)\right]^{1-\alpha} \tag{12a}$$

An unconstrained household, for which the RHS inequality holds (see 8), will choose to become entrepreneur if the LHS inequality also holds, i.e. if its ability is above a minimum value. Below this value, the household decides to be wage earner. The LHS of the selection equation does not depend on household net wealth.

For constrained households, substituting the optimal capital in 12 we get (see the Appendix point 2 for details):

$$\theta > \max\left[\frac{r}{\alpha}\left[A+\lambda(A,J)\right]^{1-\alpha}; \mu(x_1^{\gamma_1}x_2^{\gamma_2})\left[A+\lambda(A,J)\right]^{-\alpha} + r\left[A+\lambda(A,J)\right]^{1-\alpha}\right] \tag{12b}$$

As the household is financially constrained, the first term comes from (8) with the opposite sign; the second term marks the ability level required to become entrepreneur rather than wage earner. The constrained household will choose to become entrepreneur if its ability is greater than the maximum of these two values.

Let S2 stand for the first term and S3 for the second term between the squared brackets in the inequality (12b). Should $S2 \geq S3$, the ability θ required to select as entrepreneurs (>S3) is actually lower that the level above which the household is financially constrained (S2); we therefore come back in a situation that is analogous to the one presented in (12a). However, for

[7] The ability is observed. This assumption allows us to ignore problems arising from partial observability; it is

constrained households, θ is above S2 and in order to decide to become entrepreneur the household needs also to have ability greater that S3, therefore S2<S3. This marginal entrepreneur is investing less than the optimal capital. Under this case,

$$(13)\ \frac{d[S3]}{dA} = \mu x_1^{\gamma_1} x_2^{\gamma_2}(-\alpha)[A+\lambda(A,J)]^{-\alpha-1}(1+\lambda_A) + r(1-\alpha)[A+\lambda(A,J)]^{-\alpha}(1+\lambda_A) < 0$$

i.e. an increase in net wealth decreases S3 and therefore widens the acceptance region into entrepreneurship (see the Appendix point 3 for details). Contrary to unconstrained households, for which the selection equation does not depend on wealth (LHS in 12a), for constrained households, the probability of becoming entrepreneur is negatively correlated with the household initial wealth.

We finally try some comparative static using changes in the level of the legal enforcement. What happens to the impact of net wealth on the entrepreneurial income when legal enforcement J improves? We calculate the following second derivative:

$$(14)\qquad \frac{\partial^2 Y}{\partial A \partial J} = \theta\alpha\left\{(\alpha-1)[A+\lambda(A,J)]^{\alpha-2}\lambda_J(1+\lambda_A) + \lambda_{JA}[A+\lambda(A,J)]^{\alpha-1}\right\}$$

This cross partial derivative is negative as the first term is negative because $\alpha < 1$ and the second term as well because λ_{JA} is negative by assumption (an improving in legal enforcement decreases the importance of collateral for the bank, i.e. collateral and enforcement are substitutes). Hence, as far as the enforcement improves (J increases), the positive marginal impact of net wealth on entrepreneurial income decreases; when enforcement worsens (J decreases) the impact of net wealth is larger. As pointed out in other studies (Bianco, Jappelli, Pagano, 2004; Bertola, 2005), when enforcement is low, lenders are more selective in granting credit. Therefore, either the household cannot obtain the loan or the loan granted is more strongly related to its initial net wealth. In both cases, initial net wealth has a greater role in explaining the decision to become entrepreneurs.[8]

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also adopted in Cagetti and DeNardi (2003) and in Evans and Jovanovic (1989).

[8] Vice-versa should λ_{JA} be positive, this second derivative would have an ambiguous sign; we can also find that as far as the enforcement improves household wealth increases in importance in influencing the entrepreneurial

In summary, the main predictions of this model, which we are going to test in the next sections, are the following.

1) The first prediction is that an increase in net wealth determines a rise in the optimal capital and in the entrepreneurial earnings only for households that are liquidity constrained.

2) The second prediction, following from the first, is that net wealth should also influence the selection as entrepreneurs only for liquidity constrained households. Under perfect capital market *and* if talent is observed, the initial net wealth of potential entrants should not affect the selection decision.

3) The third prediction is that the second derivative of the entrepreneurial income with respect to net wealth is negative. Therefore the increase in the entrepreneurial income determined by a rise in net wealth is decreasing as net wealth gets larger, i.e. as households become richer. Loosely speaking, the impact of net wealth on income and consequently on the probability of becoming entrepreneur should be stronger when net wealth is low.

4) The final prediction is that when the degree of legal enforcement increases, the importance of an increase in net wealth for the entrepreneurial earnings and for the probability of becoming entrepreneurs should be lower.

It is important to stress that these predictions hold only if entrepreneurial ability and net wealth are *not* correlated, or in other word if ability is observed. When the assumption of zero correlation between net wealth A and entrepreneurial ability θ (or risk aversion) does not hold, these conclusions are no longer true only for constrained households. In this case there could exist a correlation between net wealth and entrepreneurial income that is driven by a third factor. For instance, if there is a positive correlation between *unobserved* ability and net wealth, a positive shock in the ability increases entrepreneurial income. At the same time, because of the positive correlation with ability, net wealth increases. You therefore *observe* an increase in entrepreneurial earnings associated with an increase in net wealth. However, the second is not causing the first. In order to test empirically the theoretical predictions of the model is therefore

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income and therefore the selection in entrepreneurship.

essential to include in the estimations a proxy for the entrepreneurial ability and for risk aversion as well; this allows us to verify the impact of net wealth *given* ability and risk aversion.

3. The data description

In this paper we use several waves of the biannual Survey of Household Income and Wealth since 1989 to 2002. The Survey is rich with information on household social, demographic and economic characteristics; data on net wealth and on the entrepreneurial business are also provided.[9]

In the analysis the definition of entrepreneur is crucial. In the SHIW wage earners are those workers who identify themselves as working for someone else. On the contrary, self-employed people work for themselves. The category of self-employed is quite wide, including a) members of arts and profession, b) sole proprietors, c) free lancers, d) owners or members of a family business, e) active shareholders and partners, f) contingent workers. A household having a member in one of the categories could be defined as entrepreneur (*entre1*). However, given the focus on the access to capital and on the relevance on initial wealth, in this paper the preferred definition of entrepreneurs is the one linked to households defining themselves as self-employed *and* also declaring a positive business value (*entre2*). It is fruitful to concentrate on the households having positive business values in order to isolate those self-employed persons who make a significant up-front investments in their business (Gentry and Hubbard, 2000). In order to check for the existence of financial constraints, initial capital requirements need not to be trivial.[10]

[9] For a comparison between the SHIW, National Accounts and Financial Accounts and for details on the Survey see Brandolini and Cannari (1994) and Brandolini (1999).

[10] Hurst and Lusardi (2004) use the Panel Study of Income Dynamics for the US and concentrate on households that report owning at least one business; therefore they define entrepreneurs as business owners. However, they stress that 30 per cent of business owners report zero business equity. Actually, in the SHIW as well around one third of entrepreneurs defined as in *entre1* have a business value equal 0 (*entre2*, Table 1a). Gentry and Hubbard (2000) analyse the households who own at least $5,000 in actively managed business. Caggetti and De Nardi (2003) do the same; they state that some self-employed households do not invest any of their (nonhuman) wealth in their activity or invest a small amount.

In table 1a we report the percentage of households that are entrepreneurs according to both the definitions above-mentioned. We also use two other definitions of entrepreneurs: the first excludes members of arts and professions (*entre3);* the second excludes members of arts and professions and also consider only entrepreneurs who declare a positive business value (*entre4*). We are going to use these definitions only for robustness tests in the following analysis. According to definition *entre1*, roughly one fourth of the households in the sample, obtained pooling all the waves of the SHIW, are entrepreneurs, while on the basis on the definition of *entre2* this percentage decreases to 16 per cent. Like in the US, no matter which definition is used, Italian entrepreneurs hold a high share of total net wealth (35.5 per cent for *entre2*). The concentration of wealth is the highest in the last quartile of net wealth, but is not negligible also in the first quartile (Table 1b). The high concentration of wealth holds even when controlling for the household income (Table 1c).

Given the theoretical predictions of the model sketched in Section 2, the first empirical exercise (in Section 4) consists in verifying the explanatory power of initial net wealth (in period t) on the household occupation decision in the following period (t+1), controlling for the relevant household characteristics. Similarly to what has been done in other empirical papers (Hurst and Lusardi, 2004), we analyse a sample of households that are not entrepreneurs in the first period considered. We then focus on a binary dependent variable taking on the value 1 if in the subsequent period the household becomes an entrepreneur and 0 otherwise. Retirees and people aged less than 18 or more than 65 are excluded from the analysis; unemployed people are included, as in Hurst and Lusardi (2004) but unlike in Evans and Jovanovic (1989). In order to increase the number of observations, we pooled all the samples obtained by considering pairs of different waves of the SHIW (1989-91, 1991-93, 1993-95, 1995-98, 1998-2000, 2000-2002). Our final sample is made of 8,264 observations. The weighted percentage of households that become entrepreneurs in the pooled sample is equal to 0.081 for the definition *entre2* of entrepreneur that we are going to consider in the following analyses (Table 2). [11]

[11] Hurst and Lusardi (2004) consider a sample including all households in the PSID between the ages of 22 and 60 that did not own a business in either 1989 or 1994 and subsequently remain in the PSID for one additional year. Their total sample has 7,645 observations and the weighted percentage of households that become business owners in the subsequent year is 0.045.

Using longitudinal analyses and considering the transition to entrepreneurship reduces the likelihood that explanatory variables, considered *before* the transition, are a consequence and not at the origin of the decision to become entrepreneurs. This is a typical flaw of the studies that analyses the probability of being an entrepreneur rather than becoming an entrepreneur. Therefore if initial net wealth is relevant to the decision of becoming an entrepreneur, we are lead toward the conclusion that wealth causes entrepreneurship rather than the other way round. However, the problem of endogeneity is not entirely eliminated: individuals may accumulate wealth in anticipation of becoming entrepreneurs. In order to tackle the endogeneity problem of wealth in Section 5 we present an instrumental variable estimation. Several other specifications are also tried in that section.

In the second estimation, carried out in Section 6, the aim is to test the relevance of initial net wealth in influencing the size of the business conditional on becoming entrepreneur. Two different dependent variables are used: the value of the business and the number of people working in the business.

As stated above, the unit of analysis is the household. If the head is self-employed, his personal characteristics are used in the estimation. On the contrary, if the head of the household is not self-employed, the characteristics of the other member of the household that declares to be self-employed are considered; generally, it happens to be the spouse, less frequently a son or daughter. In the estimations different variables are used as explanatory variables; we also include several household characteristics as control variables, which can influence the shape of the household utility function and therefore the occupational choices.

In detail, in this paper we measure household net wealth as the sum of real and financial assets after subtracting liabilities. As mentioned, this is the household net wealth measured *before* becoming entrepreneurs. In the estimation we also include household labour income; this variable should control for any income effects that may be involved in the choice. Specifically, because we consider people who initially are not entrepreneurs, their labour income measures only wage income: labour income could be negatively linked to the decision of becoming entrepreneur, the idea being that if the labour income is lower the agent has a greater incentive to shift into entrepreneurial status. On the other hand, a higher household labour income is normally associated with a high number of income earners in the family (the correlation is 0.48) and a lower risk aversion (the correlation is -0.15). A higher labour income may hence decrease the

weight of the higher income risk associated with entrepreneurial status and thus increase the probability of becoming entrepreneur.

We further include some other important explanatory variables. In order to control for the entrepreneurial ability θ, we include the possibility of learning informal business experience from their parents (Holtz-Eakin et al, 1994; Guiso and Schivardi, 2002). In detail, we use a dummy equal to 1 if one of the parents, either of the head or of the spouse, was self-employed. Further, on a smaller sample we try to better gauge entrepreneurial ability with a dummy that takes on the value 1 if the would-be entrepreneur had already some previous work experience as self-employed (Hurst and Lusardi, 2004). Finally, on a still smaller sample we also include a measure of absolute risk aversion, as calculated in Guiso and Paiella (2003). Despite the extent of non-response and the measurement error, this risk attitude indicator should capture the individual willingness to bear risk of the respondent. Specifically, Guiso and Paiella (2003) find that differences in the degree of risk aversion seem to explain sorting into riskier occupations.

As control variables we first include age as a measure of the attitude toward risk. Individual will try riskier occupation, such as becoming entrepreneurs, when they are younger. Age may be an indicator of individual experience in labour market as well. We also include two demographic controls for marital status and the number of children. Having to support a family can make people less willing to take the higher income risk associated with entrepreneurship; on the other hand, a family may support the business activity. Finally we also take in the estimation a dummy for the education, also for the parents' education, the sex and the status of unemployed.

In table 2 we present descriptive statistics on the explanatory variables for the whole sample and the two sub-samples of households that become entrepreneurs and stay wage earners in the subsequent period. All the nominal variables are expressed at 1995 prices.

4. The probability of becoming entrepreneurs and the initial net wealth

In this section the results concerning the probability of becoming entrepreneurs are presented. As mentioned, we consider the entrepreneurs who declare a positive value for their business (*entre2*), the idea being that liquidity constraints can be binding only if initial capital requirements are not trivial. The results of the probit estimation are reported in Tables 3 and 4. In

all the estimations we control for business cycles using year dummies; we also include fixed effects for the 95 Italian provinces.

Table 3 presents the results obtained with linear household net wealth. Table 4 includes the results when the coefficient of net wealth is allowed to change in the different quartiles of net wealth. In what we call model 1, the entrepreneurial ability is measured with a dummy equal to 1 if one of the parents (either of the head or of the spouse) was self-employed. In model 2 we also include a variable measuring previous experience as self-employed: however, the number of observations strongly decreases, as this variable is available only since 1998. In model 3 a measure of household risk aversion is included as well; also in this case we are forced to work with a still smaller number of households.

Considering model 1 (7,255 observations[12]), like in many other papers referring mainly to the US and the UK, net wealth has a positive and significant effect. On the ground of the theoretical model presented in Section 2, this result is traditionally interpreted as an evidence of liquidity constraints. The economic impact is not trivial: increasing net wealth by 100,000 euro, an admittedly strong increase compared to the average value of net wealth (92,000 euro, Table 2), but useful for comparison with other studies, the probability increases by 20 per cent (from 6.5 p.p. to 7.9 p.p.[13]). To further explore this issue, we allow the coefficient of net wealth to be different for households belonging to the fourth quartiles of net wealth. The third theoretical prediction of the model in Section 2 is that the importance of net wealth in alleviating liquidity constraints should decrease with high level of net wealth. In the second column of Table 4 (model 1), consistently with the predictions, the marginal effect of net wealth is *decreasing* as far as we go trough the quartiles of net wealth. More specifically, the coefficient of net wealth is highest in the first quartile, though it is not statistically significant. It is significant in the other quartiles and lower for the richest households; a Wald test shows that the coefficients in the second and the third quartiles are significantly different from the coefficient in the fourth quartile. The absence of a significant effect of initial wealth for the poorest households can be partly rationalised in this

[12] In the estimations in Tables 3 and 4 for model 1, the sample obtained from the pair 1989-1991 of the SHIW is automatically excluded because it does not contain the variable referring to the occupation position of the parents.

[13] In Hurst and Lusardi (2004), increasing net wealth by $100,000 the probability of becoming an entrerpreneur increases from 4.5 p.p. to 5 p.p.. The corresponding marginal effect is hence equal to an increase by 10 per cent.

way. As argued by Fairlie (1999), for the poorest households an increase in net wealth could not be enough to make lenders consider the household loan application; small increases in their assets cannot be utilised to borrow substantially more money for start-up capital.[14] Bester (1987) uses similar arguments: in his model of credit market with imperfect information, lenders may use collateral either to sort borrowers of different riskiness or as an incentive mechanism because higher collateral enforces a borrowers' choice of less risky projects. Exclusion from the credit market can occur if the borrowers' collaterizable wealth is too small to allow perfect sorting or to create sufficiently strong incentives. There could therefore exist a threshold (the first quartile of initial wealth is equal for our sample to 10,000 euro) under which initial wealth is too small to influence the lender decision and therefore the probability of becoming entrepreneurs.

As for the economic impact, increasing initial net wealth by 100,000 euro makes the probability of becoming entrepreneurs twice as big in the second and third quartiles of net wealth; it increases the same probability by 20 per cent in the fourth quartile. The evidence is confirmed when similar estimations are run on sub-samples of observations belonging to different quartiles of net wealth (not reported) instead of using interaction terms; the estimation by samples split is more flexible as *all* the variables are allowed to have different coefficients by the four quartiles of net wealth. Finally, we want to stress that in the estimation presented for model 1 in Table 4 (second column) we also allow for a shift in the intercept in the four different quartiles of net wealth, on the grounds that richer people can either have a lower degree of risk aversion or may be endowed with more entrepreneurial talent that we are not able to correctly measure; the coefficients of these dummies are not significant, but the one for the third quartile of wealth[15].

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[14] Fairlie (1999) studies entrepreneurship among African-American men. He argues that the relationship between assets and the probability of entering self-employment for blacks is likely to be different than for whites if black face lending discrimination. The existence of lending discrimination, however, does not necessarily imply that the effect of assets is stronger for blacks. Two forces are at work. First, blacks have a higher probability of facing liquidity constraints because of lending discrimination. This increases the strength of the relationship between assets and the probability of entering entrepreneurship. However, because blacks face lending discrimination, *small increases* in their assets cannot be utilised to borrow substantially more money for start-up capital. This second effect decreases the strength of the relationship between asset levels and the probability of choosing self-employment for blacks relative to whites.

[15] The coefficient of the dummy for the third quartile of wealth is negative. Households in this quartile appear to have a lower probability to become entrepreneurs. This is probably because they are less likely to have previous experience as self-employed, which we are using to improve the measure of entrepreneurial ability in model 2 (the relative dummy, weighted using SHIW sample weights, is equal to 0.228, 0.299, 0.253, 0.297 respectively in the fourth quartiles of wealth).

Not allowing for a shift in the intercept, results are similar, though the coefficient of net wealth in the third quartile is lower and closer to the coefficient in the fourth quartile.

As for the other household characteristics used as control variables, we notice that the relationship between the probability of becoming entrepreneurs and age is U-shaped. The probability decreases until a minimum, when age is around 50 years (the 75 percentile), and increases thereafter.[16] This result is partly consistent with the interpretation that becoming entrepreneur increases the income risk; this decision is hence more likely to be taken when people are young. However, there is also a group of people that is more likely to select as entrepreneur when they grow old; a possible explanation is that they need time to pile up assets required to the transition. We are going to explore this explanation. Further, an increase in the number of the children decreases the probability of enter entrepreneurship, probably because of the need of a more stable income to support a family. Males are more likely to become entrepreneur. People who attain a higher level of education are less likely to enter entrepreneurship: a dummy for high school education has a negative coefficient. We will see that this will not be true when considering also entrepreneurs with a value of business equal to zero, who are more likely to be professionals, or when we consider only young entrepreneurs. Having initial higher labour income increases the probability to select into entrepreneurship, which supports the conclusion that higher labour income reduces household risk aversion. Finally, the likelihood of transition into entrepreneurship is higher when one of the parents was self-employed: it increases by 3.6 percentage points, roughly half of the estimated probability (6.5 p.p.).

In estimating model 2 we try to better control for the entrepreneurial ability by including also a dummy that is equal to 1 if people had previous experience as self-employed. This variable is available since 1998 and therefore the number of observations is strongly reduced (N=2,610). For people that already had an experience in self-employment the odds of transition into

[16] In Holtz-Eakin et al (1994b) the probability of becoming entrepreneur generally decreases with age. A similar result is in Hurst and Lusardi (2004; first version of the paper, as in the final version they do not show the coefficient of the control variables).

entrepreneurship greatly increases[17]. In this estimation, age and education lose their explanatory power, but initial net wealth has still a positive and significant effect, though roughly halved in magnitude (Table 3, column 3). Considering column 3 of Table 4, where the coefficients of net wealth are allowed to change in the quartiles of net wealth, the evidence is similar to the one obtained when using model 1. The coefficient of net wealth is highest, though not significant, in the first quartile of net wealth; it is decreasing for the other quartiles. In this estimation we have not included dummies for a shift in the intercept in the different quartiles of wealth, as their coefficients are never significant. Actually, including a dummy for previous experience as self-employed is probably enough to capture shift in the intercept in estimating the probability of becoming entrepreneurs in different quartiles of wealth (footnote 14).

In estimating model 3 we include a measure of household risk aversion. As this measure can be obtained only in the 1995 and 2000 SHIW, to avoid a strong reduction in the number of observations we exclude the dummy included in model 2 to better control for the entrepreneurial ability with previous work experience. The number of observations decreases to 1,854. In column 4 of Table 3 the evidence is that in this case the linear term of net wealth is no longer significant. The coefficient of absolute risk aversion has the expected negative sign, but is very imprecisely estimated. In this model the only variables retaining explanatory power are the number of children (negative effect) and the dummy measuring the fact that parents were self-employed (positive effect). When allowing the coefficients of net wealth to be different in the four different quartiles of net wealth (column 4 of Table 4), the evidence is not very different from the previous one, but for the coefficient of net wealth in its third quartile that is no longer significant. As for model 2, in this estimation we do not include the possibility of a shift of the intercept in the quartiles of wealth, because the coefficients of these dummies are never significant. A change in the intercept in the quartiles of wealth could be motivated by either different risk aversion or talent, which are likely to be already captured by proxies used in the estimation.[18]

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[17] Considering people who select into entrepreneurship, more than 70 per cent had previous experience in self-employment (Table 2). This explains the high marginal effect associated with this dummy.

[18] Following what has been stated in footnote 14 for the measure of entrepreneurial talent, we notice that absolute risk aversion, weighted using SHIW sample weights, is equal to 0.164, 0.164, 0.148, 0.145, respectively in the four quartiles of wealth.

Overall, the evidence in this section is that initial net wealth is relevant in influencing the selection as entrepreneurs. More interestingly, the marginal effect of net wealth is decreasing as far as net wealth gets larger. Net wealth is mainly relevant in the second quartile of wealth and its importance is lower for the richest households, in third and fourth quartiles. The absence of a significant effect for the poorest households in the first quartile of wealth is against the theoretical previsions of the model, though can be explained by a wealth threshold effect. As stated by some models on credit markets with imperfect information (Bester, 1987), a complete exclusion from credit market can occur if the borrowers' collaterizable wealth is *too small* to allow perfect sorting according to the borrowers' risk or to create sufficiently strong incentives. Further, in the following section we are going to present some estimation where the effect of initial wealth is significant for the poorest households as well.

5. Instrumental variable estimation, sample selection and the impact of legal enforcement

In this section we tackle some of the problems that can arise when estimating the probability of starting a business as in the previous section.

First, we consider that net wealth, even if we use its value before the decision to become entrepreneurs, can be endogenous to the same decision; for instance, people may pile up assets foreseeing the future transition in entrepreneurship. More specifically, endogeneity arises if there are unobserved household features that are correlated with both net wealth and the household's propensity to start a business. If unobserved or not accurately measured, these household features, like entrepreneurial talent or risk aversion, are included in the error term of the estimation, creating an endogeneity problem for net wealth.

To overcome this problem, we follow other empirical papers and we instrument net wealth. Inheritances or transfers received in the years before the transition into entrepreneurship are frequently considered as a good instrument for the household net wealth. Inheritances are correlated with net wealth, but should not be with the error term in the probability model. However, even this instrument cannot be considered completely exogenous to the decision of

becoming entrepreneurs as people can inherit a business as well as money.[19] Therefore, as a further instrument for net wealth we use labour income in the year before the transition, which is highly correlated with initial net wealth (the correlation coefficient is 0.4) and the dummy measuring parents' education, i.e. whether parents are university graduate[20]. To avoid a strong reduction in the number of observations, we estimate only model 1 of Table 3. In Table 5 (second column) we present the estimation obtained with instrumented net wealth. Compared to Table 4 the evidence is strengthened: the coefficient of net wealth is clearly decreasing according to quartiles of net wealth and is significant for the poorest households as well.[21]

Secondly, in this section we consider the fact that selecting only those households that, for each pair of the SHIW, in the first period were not holding a business may create a sample selection bias. If a household is rich and has not yet decided to become entrepreneur, it could be that its entrepreneurial talent is very low; this could create a downward bias for the coefficient of net wealth referring to the richest households. For this reason we run the same estimations as in Table 4 only for households whose head is young (i.e. aged more than 18 but less than 40). This sample of households can be thought of as facing initial serious occupation choice problem. Moreover, if liquidity constraints are binding, they should be more severe for young people, who have less time to accumulate assets. In Table 5 (third column), results obtained with model 1 (N=2,020) show that initial net wealth is more important in influencing the selection in entrepreneurship in the first two quartiles of net wealth; net wealth is also significant for the richest households (fourth quartile), but the magnitude of the coefficient is one tenth of the coefficient in the second quartile.[22] In this estimation, unlike the previous estimation on the whole sample, graduate people are more likely to become entrepreneurs (the probability increases by 5 percentage points, while the predicted probability is equal to 7.2 p.p.).

Further, in this paragraph we check the fourth prediction of the model presented in Section 2. Household initial net wealth should become more important in influencing the selection as

[19] Nonetheless we try to control for business talent in the estimation.

[20] The explained variance in the first regression is roughly equal 0.24.

[21] The estimation does not allow a shift in the intercept for the quartiles of net wealth, which are never significant.

[22] The estimation does not allow a shift in the intercept for the quartiles of net wealth, which are never significant.

entrepreneurs when the legal enforcement of creditors' rights is low. To test this hypothesis, we interact net wealth in its quartiles with a measure of the share of loans recovered in the case of customer default. This is an indicator of the quality of legal enforcement: the more the share recovered, the better the enforcement. Italian banks directly provided this measure in a questionnaire referring to the years 1992 and 1993.[23] It is measured at the regional level and has no time variability; in other words, in this way we have a ranking of the geographical legal enforcement in Italy at the beginning of the 1990s and we consider it fixed for the following years.

The results, presented in Table 5 (column 4), are striking. As said, when the quantity recovered in the case of default increases, we expect net wealth to matter less; this effect is likely to be less strong for the richest households. The evidence strongly conforms to these predictions. As shown by the coefficients of net wealth not interacted, net wealth is very important when the quantity recovered is equal to zero, especially in its first quartile.[24] The importance of net wealth decreases as the recovered share increases, because all the interaction terms have the expected negative signs. Further, the coefficients of the interaction terms are decreasing with net wealth, though they are significant only in the second and third quartile of net wealth.

We try the same exercise using a different indicator of the well functioning of legal enforcement, and therefore of the credit market, i.e. the loan-value ratio. This is the ratio between the amount of the mortgage granted to a household and the value of the house; in the past this ratio was far lower in Italy compared to other countries, though nowadays it has been increasing. This ratio can be calculated for the four last waves of the SHIW; we compute the average regional value of the ratio (weighted average). The results, though less clear-cut, go in the same direction.

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[23] The questionnaire was submitted to a representative sample of banks (more than 250 banks representing roughly 90 per cent of total loans). Only mortgage proceedings for insolvency concerning households are considered.

[24] When the recovered share of the loan is equal zero, the first derivative of the probability of becoming entrepreneurs with respect to net wealth is given *only* by the direct effect, i.e. the coefficient of net wealth not interacted. When the recovered share is greater than zero, you have to sum up the indirect effect (interaction effect) to the direct one to obtain the total effect.

Finally, we verify whether net wealth is more important for households that define themselves as liquidity constrained. In the SHIW people were asked whether they applied for a loan and whether a bank or a financial company turn them down. We define as liquidity constrained the households whose loan application is rejected or who received only a part of the money requested[25]. We estimate a regression where the coefficient of initial net wealth is allowed to change between the households that are liquidity constrained or not. We expect the coefficient of initial net wealth to be higher for the first group of households. This is actually the case and the difference is statistically significant (Table 5, column 5). Similarly, the coefficient of initial net wealth is higher for households that obtained loans from relatives and friends (not reported). This is an important source of finance for new business and a typical way of accessing capital when there are imperfections in the credit market.[26] However, the difference in the coefficients is not statistically significant.

6. The initial wealth and the size of the business

This section is aimed at verifying the impact of the initial net wealth on the size of the business conditional on becoming entrepreneurs. It could be argued that financial constraints do not only hamper the decision of selecting as entrepreneurs, but may also entail the creation of undersized businesses. Due to data limitation, this issue was less frequently explored in other empirical papers (Hurst and Lusardi, 2004). In the SHIW we are allowed to use two possible measures of the size of the business. The first is the market value of the firm and the second is the number of people employed in the business. We also assess the impact of net wealth on the entrepreneurial income, though this is not properly a measure of size.

As the size of the business can be observed only for people becoming entrepreneurs, a sample selection problem arises that could bias the results if the correlation between the errors in

[25] The questions of the SHIW used in the analysis concerning the participation in the debt market are the following. 1) In the year did your household apply to a bank or a financial company for a loan or a mortgage? 2) Was the application granted in full, in part or rejected? For the 1991 and 1993 surveys, the choice is only between granted and rejected; households answering "partially rejected" are classified as liquidity constrained.

[26] Evans and Jovanovic (1989) say that loans from friends and relatives may be one means to evade the liquidity constraint.

the probability model and in the size model is different from zero. In this section we therefore estimate a Heckman model, which takes into account the selection issue under the assumption of normality of the error term in the main estimation. In all Heckman regressions, the hypothesis of zero correlation of the errors is always rejected. Therefore independent estimation of the business size only for people that become entrepreneurs should bias the result. In the Heckman estimation we use the following identification conditions, i.e. exclusion restrictions. We exclude from the estimation of the business size the number of children, the household labour income and the unemployment status, based on the idea that all these variables should only play a role in the selection as entrepreneurs. Specifically, the number of children in the selection equation has a negative impact; therefore, having children should essentially deter people from becoming entrepreneur, rather than help in managing a business. Household labour income has a positive sign in the selection equation and is likely to be linked to the degree of household risk aversion: when the number of income recipients decreases, the labour income decreases, the income risk increases and the probability of choosing a riskier occupation is lower. However, this variable should not affect the business size. A similar explanation holds for the unemployment status.

In Table 6 results are presented only for the specification allowing the coefficient of net wealth to be different by quartiles. As before, in these estimations we control for unobserved geographical heterogeneity with provincial dummy. To avoid a strong reduction in the number of observations, we only estimate model 1 as defined before. Overall, in the selection equation of the Heckman models we find similar results to the ones presented in previous sections and we do not report them again.

In columns 2 and 3 of Table 6 we present respectively the preliminary results for the two measures of business size. We use both the market value of the business, that is essentially a value that household is required to assign to its capital and goodwill[27], and the number of employees working in the business. After dropping some outliers for dependent variables[28], the main finding is that an increase in net wealth does not basically influence the size of the business.

[27] This value also includes the share of the market value of the firm for active shareholders and partners.

[28] We drop the observations for which the dependent variable is lower than 1st percentile and higher than 99th percentile.

This is more evident when using the number of employees, while for the value of the business there is a significant and positive effect for the households belonging to the second quartile of wealth.

Overall, giving more wealth to households seems to have either a limited or no impact on the size of the business, once the households have decided to become entrepreneur.

7. Alternative specifications

In this final section we present the evidence obtained with alternative specifications in order to check the sensitivity of the results commented in previous sections.

First we check the sensitivity of our results to alternative definition of entrepreneurs. As mentioned in Section 3, in the previous analysis we consider as entrepreneurs the households in which one of the member was self-employed *and* declare positive business value (*entre2*). To check for the existence of financial constraints, initial capital requirements need not to be trivial (Gentry and Hubbard, 2000; Cagetti and De Nardi, 2003). In this section we change our definition and consider as entrepreneurs all the households that just have a member that defined himself as self-employed, without conditioning on the value of the business (*entre1*). This definition is more similar to the one used in Hurst and Lusardi (2004). In this case the evidence is quite different as net wealth is more relevant for selecting in entrepreneurship for the richest households, in the direction of the evidence found by Hurst and Lusardi. In estimating model 1 (unreported), we observe that the coefficient of net wealth is significant only in the third and the fourth quartiles of net wealth, though in the third quartile net wealth has a higher coefficient. However, when instrumented net wealth no longer has an effect on the probability of starting a business. An effect of net wealth on the business size seldom appears. Therefore, in order to get the previous results on the probability of becoming entrepreneurs, we find it essential to condition the analysis on entrepreneurs declaring a business value greater than zero as we did before. It is actually

difficult to talk about financial constraints if there is no capital to acquire, as is the case for one-third of entrepreneurs in the *entre1* definition (Table 1).[29]

On the same line, we try an estimation of the model 1 with two other definitions of entrepreneur. We therefore exclude the members of arts and professions and contingent workers, who do not properly manage a business *(entre3)*. We also focus on the households that declare positive value of the business for this second definition of entrepreneur *(entre4)*. Results for *entre3* and *entre4* are similar to those obtained with *entre1* and *entre2* respectively.

When correcting the standard errors for the possible correlation of the observations belonging to the same provinces, i.e. by controlling for neighbouring effects, all the previous results concerning either the probability of selecting as entrepreneurs or the size of the business hold. Similar results for the decision to select in entrepreneurship also arise when we try estimations for the households that are continuously present in the SHIW respectively for the periods 1989-1995 and 1995-2002. This estimation is quite interesting because it allows us to consider households that are not entrepreneurs in 1989 (1995), become entrepreneurs or not in 1991 (1998) and, in the first case, stay as entrepreneurs in the following years. For this estimation we also find that household wealth has an effect in influencing the probability of becoming and *staying* entrepreneurs; this effect is stronger for the poorest households.

As a robustness test we try another exercise as in Hurst and Lusardi (2004). In the dynamic model proposed by Buera (2004), the selection in entrepreneurship is influenced by accumulating net wealth in advance of starting a business, rather than by the level of net wealth itself. Hence, we include in the estimation the change in net wealth in the two years before the transition. In an unreported estimation we find that changes in net wealth have a decreasing impact as we go through higher quartiles of net wealth; the effect is significant in all quartiles. Further, changes in net wealth matter for the transition only if they are greater than the third quartile (around 36,000 euro). This could be rationalised with the idea expressed in Fairlie (see footnote 13) that small increases in assets cannot be sufficient to borrow substantially more money for start-up capital.

[29] It is worth stressing that considering new entrepreneurs, the percentage of entrepreneurs with business value equal to zero is higher than for established entrepreneurs and around 60 per cent.

As a final robustness check on the results, we try another estimation where we consider only the personal characteristics of the household head, even if another member of the household is the entrepreneur. The purpose of this exercise is to attach to the household the characteristics of the member that is more relevant from an economic point of view. Results are similar both for the probit estimation and for the size regression.

8. Final remarks

The evidence that this paper brings in is in favour of the importance of the initial net wealth for starting a business. This can partly explain the high concentration of net wealth among entrepreneurs.

The importance of net wealth for selecting in entrepreneurship is decreasing as net wealth becomes larger. For the richest households, i.e. those belonging to the fourth quartile of net wealth, the impact of an increase in wealth in influencing the probability of becoming entrepreneurs is far smaller. Further, the impact of net wealth is stronger both when legal enforcement is lower and for households whose loan applications have been rejected by banks. Finally, net wealth has either no or limited impact on the size of the business, measured both by the number of employees and the value of the business.

This evidence is consistent with the fact, emerging from the SHIW, that debt used for business purposes is not very widespread among small entrepreneurs (less than a quarter have business debt) and its amount is quite modest (Table 1d). Conditional on being entrepreneurs with positive business value (*entre2*), the median (average) value of the business is around 15,151 euro (59,016), while the median (average) value of the household debt for business purposes is equal to 0 (4,252 euro). This picture is different compared with the one mentioned in Hurst and Lusardi (2004). They reckon that in the US, on the basis of the firms surveyed by the National Survey of Small Business Finances, the large majority (around 75 per cent) of small firms report borrowing from several different sources and in several different forms. Nonetheless, empirical studies show that financial constraints appear to exist also in the United States, even if Hurst and Lusardi (2004) evidence casts some doubts on their extent.

Summing up, imperfections in financial markets, either in the form of a quantity constraint as in the model analysed in this paper or in the form of an increasing premium in the cost of

external finance, appear to induce people to pile up assets before and in order to become entrepreneurs. When they decide to entry into entrepreneurship, they reach the optimal size: receiving more money has essentially limited or no effect on the size of the business.

Appendix

Point 1

Following Evans and Jovanovic (1989), we substitute the optimal capital for unconstrained households in (7) into the selection equation (12) and we get

(a1) $$\theta^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}} - r\left(\frac{\alpha}{r}\right)^{\frac{1}{1-\alpha}}\theta^{\frac{1}{1-\alpha}} \geq \mu x_1^{\gamma_1} x_2^{\gamma_2}$$

then considering that:

(a2) $$rr^{-\frac{1}{1-\alpha}} = r^{-\frac{\alpha}{1-\alpha}}$$

the inequality in (a1) becomes

(a3) $$\theta^{\frac{1}{1-\alpha}} r^{-\frac{\alpha}{1-\alpha}}\left[\alpha^{\frac{\alpha}{1-\alpha}} - \alpha^{\frac{1}{1-\alpha}}\right] \geq \mu x_1^{\gamma_1} x_2^{\gamma_2}$$

Taking into account that

(a4) $$\alpha^{\frac{1}{1-\alpha}} = \alpha\alpha^{\frac{\alpha}{1-\alpha}}$$

then (a3) is equal to

(a5) $$\theta^{\frac{1}{1-\alpha}} r^{-\frac{\alpha}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}}(1-\alpha) \geq \mu x_1^{\gamma_1} x_2^{\gamma_2}$$

Raising both sides to the power $(1-\alpha)$ we get:

(a6) $$\theta r^{-\alpha}\alpha^{\alpha}(1-\alpha)^{1-\alpha} \geq \mu^{1-\alpha}(x_1^{\gamma_1} x_2^{\gamma_2})^{1-\alpha}$$

The LHS inequality in (12a) is hence obtained.

Point 2

As for constrained households, we analogously substitute the optimal capital in (7) into the selection equation (12) and we get;

(a7) $$\theta\left[A+\lambda(A,J)\right]^{\alpha}-r\left[A+\lambda(A,J)\right]\geq\mu x_1^{\gamma_1}x_2^{\gamma_2}$$

and therefore

(a8) $$\theta\geq r\left[A+\lambda(A,J)\right]^{1-\alpha}+\mu x_1^{\gamma_1}x_2^{\gamma_2}\left[A+\lambda(A,J)\right]^{-\alpha}$$

The term in (a8) is the second element in the inequality (12b).

Point 3

Calculate the following derivative:

(a9) $$\frac{d[S3]}{dA}=\mu x_1^{\gamma_1}x_2^{\gamma_2}(-\alpha)\left[A+\lambda(A,J)\right]^{-\alpha-1}(1+\lambda_A)+r(1-\alpha)\left[A+\lambda(A,J)\right]^{-\alpha}(1+\lambda_A)$$

This derivative can be written as:

(a10)

$$-\alpha\left\{\mu x_1^{\gamma_1}x_2^{\gamma_2}\left[A+\lambda(A,J)\right]^{-\alpha}+r\left[A+\lambda(A,J)\right]^{1-\alpha}\right\}\left[A+\lambda(A,J)\right]^{-1}(1+\lambda_A)+r\left[A+\lambda(A,J)\right]^{-\alpha}(1+\lambda_A)$$

You can also write:

(a11) $$-\alpha\{S3\}\left[A+\lambda(A,J)\right]^{-1}(1+\lambda_A)+r\left[A+\lambda(A,J)\right]^{-\alpha}(1+\lambda_A)$$

and notice that, because S2<S3, a11 is lower than

(a12) $$-\alpha\{S2\}\left[A+\lambda(A,J)\right]^{-1}(1+\lambda_A)+r\left[A+\lambda(A,J)\right]^{-\alpha}(1+\lambda_A)$$

Substituting the expression in S2 you obtain

(a12) $$-\alpha\left\{\frac{r}{\alpha}\left[A+\lambda(A,J)\right]^{1-\alpha}\right\}\left[A+\lambda(A,J)\right]^{-1}\left(1+\lambda_A\right)+r\left[A+\lambda(A,J)\right]^{-\alpha}\left(1+\lambda_A\right)$$

that is equal to zero.

Therefore a11 is negative and the derivative in a9 as well. As S3 is lower when net wealth increases and nearer to S2, the acceptance region to select into entrepreneurship increases.

Tables and Figures

Table 1a

ENTREPRENEURSHIP AND WEALTH CONCENTRATION

Definition of entrepreneurs	Percentage of entrepreneurs	Percentage of net wealth held by entrepreneurs	Percentage of total assets held by entrepreneurs
Entre1	24.4	45.7	45.5
Entre2	16.0	35.5	35.3
Entre3	19.4	36.3	36.1
Entre4	14.1	31.2	30.9

Source: calculations using 55,845 observations from the pooled data of the SHIW 1989-2002. Data are weighted using SHIW sampling weights. *Entre1=1* if one of the member of the household belongs to one of the following categories: a) members of arts and profession, b) sole proprietors, c) free lancers, d) owners or members of a family business, e) active shareholders and partners, f) contingent workers employed on none account. *Entre2=1* if *Entre1=1* and the household declares a positive business value. *Entre3=1* is a similar condition as *Entre1=1* excluding from the definition the a) members of arts and profession and f) contingent workers. *Entre4=1* if *Entre3=1* and the household declares a positive business value.

Table 1b

ENTREPRENEURSHIP AND WEALTH CONCENTRATION BY WEALTH DISTRIBUTION

	Percentage of entrepreneurs	Percentage of net wealth held by entrepreneurs	Percentage of total assets held by entrepreneurs
Overall	16.0	35.5	35.3
Net wealth quartiles			
1° quartile	3.4	5.1	6.8
2° quartile	10.4	10.8	10.9
3° quartile	15.9	16.5	16.5
4° quartile	34.6	44.3	44.4
80-90	21.2	21.3	21.5
90-95	37.9	38.1	38.6
95-100	55.0	59.5	59.7

Source: calculations using 55,845 observations from the pooled data of the SHIW 1989-2002. Data are weighted using SHIW sampling weights. Statistics are reported for *Entre2=1*. Similar results hold for the other definition of entrepreneurs.

Table 1c

ENTREPRENEURSHIP AND WEALTH CONCENTRATION BY INCOME DISTRIBUTION

	Percentage of entrepreneurs	Percentage of net wealth held by entrepreneurs	Percentage of total assets held by entrepreneurs
Overall	16.0	35.5	35.3
Income quartiles			
1° quartile	7.10	25.7	25.8
2° quartile	12.5	23.6	23.5
3° quartile	17.8	28.2	27.9
4° quartile	27.8	43.1	42.9
80-90	19.7	29.7	29.3
90-95	28.7	41.7	41.5
95-100	42.8	53.7	53.6

Source: calculations using 55,845 observations from the pooled data of the SHIW 1989-2002. Data are weighted using SHIW sampling weights. Statistics are reported for Entre2=1. Similar results hold for the other definition of entrepreneurs.

Table 1d

DISTRIBUTIONS OF INITIAL NET WEALTH, BUSINESS ASSETS, BUSINESS DEBT AND BUSINESS EQUITY FOR BECOMING ENTREPRENEURS
(data in 000 euro)

	Initial non business net wealth	Business assets	Business net debt (debts – trade credit)	Business equity
1 percentile	0	0,238	-16,964	-3.6451
5 percentile	1,131	0,955	-4,1317	0,6454
10 percentile	2,671	2,458	-1,1309	2,2773
25 percentile	19,232	5,165	0	5,1646
50 percentile	84,519	15,151	0	14,702
75 percentile	175,695	56,545	0,005	51,646
90 percentile	280,797	137,356	6,198	134,874
95 percentile	410,193	226,181	22,618	206,583
99 percentile	481,915	457,852	130,054	457,854
Mean value	120,648	59,016	4,252	57,246
Percentage of entrepreneurs with net debts (debts -trade credit)			23.5	
Percentage of entrepreneurs with gross debts (excluding trade debts)			20.4	
Percentage of entrepreneurs with gross debts (including trade debts)			29.3	

Source: calculations using 622 observations of new entrepreneurs. Statistics are reported for *entre2*. Data are weighted using SHIW sampling weights. Business debts can also be negative as they are the sum of short and long- term debt (bank and trade debt) net of trade accounts. Business equity is the difference between business assets and business debt. Gross debts include medium and long-term debts for buildings or lands or for business-related investments, short-term debts with banks and financial companies and trade debts.

Table 2

DESCRIPTIVE STATISTICS
(average values)

Variables	Whole sample N=8,264	Staying wage earners A N=7,642	New entrepreneurs B N=622	p-value of the difference A-B=0
Becoming entrepreneur -dummy	0.081			
Value of the business (000 euro)			59,016	
No. of employees			5.21	
Age	42.00	41.95	42.59	0.0786
High school – dummy	0.344	0.348	0.306	0.0348
Graduate – dummy	0.102	0.099	0.132	0.0089
Unemployed – dummy	0.037	0.039	0.015	0.0029
Married – dummy	0.818	0.817	0.833	0.3007
Male – dummy	0.808	0.805	0.843	0.0214
No. of children	0.983	0.997	0.818	0.0000
Household initial net wealth (000 euro)	92,11	92,86	120,65	0.0000
Household labour income (000 euro)	18,66	18,50	20,39	0.0000
Self-employed parents - dummy	0.399 N=7,316	0.386 N=6,744	0.542 N=572	0.0000
Graduate parents – dummy	0.050 N=7,316	0.048 N=6,744	0.077 N=572	0.0018
Previous experience as self-employed – dummy	0.270 N=2,873	0.230 N=2,655	0.743 N=218	0.0000
Absolute risk aversion	0.155 N=2,130	0.155 N=1,971	0.148 N=159	0.0938

Source: the sample is obtained considering in pair different waves of the SHIW (1989-1991; 1991-93; 1993-95; 1995-98; 1998-00; 2000-2002). All households that in the first period are not entrepreneurs according to the definition *Entre2* are considered in the whole sample, pooled together. Stay wage earners do not become entrepreneurs in the second period. New entrepreneurs become entrepreneurs in the second period. All the nominal variables are expressed at 1995 prices.

Table 3

THE PROBABILITY OF STARTING A BUSINESS: LINEAR NET WEALTH
(pooled probit estimation - marginal effects - 1991-2002)

Variables	Model 1	Model 2	Model 3
Age	-.01078 (-4.10)	.00124 (0.34)	-.00818 (-1.55)
Age squared	.00011 (3.64)	-.00002 (-0.58)	.00008 (1.25)
High school - dummy	-.01852 (-2.78)	-.00062 (-0.08)	-.01752 (-1.43)
Graduate - dummy	-.00424 (-0.42)	.00761 (0.61)	-.00472 (-0.25)
Unemployed - dummy	-.02067 (-1.38)	.00063 (0.03)	-.03924 (-1.46)
Married - dummy	.00670 (0.73)	.02919 (3.04)	.01491 (0.85)
Male - dummy	.01440 (1.77)	.01151 (1.30)	.00137 (0.09)
No. of children	-.01521 (-4.30)	-.01303 (-3.10)	-.01697 (-2.49)
Household labour income	.00058 (1.72)	-.00014 (-0.37)	.00014 (0.22)
Self-employed parents - dummy	.03602 (5.87)	.02102 (2.74)	.04925 (4.15)
Graduate parents – dummy	.00577 (0.42)	.01045 (0.62)	.00327 (0.12)
Previous experience as self-employed – dummy		.20555 (15.3)	
Absolute risk aversion			-.03123 (-0.26)
Household net wealth	.00014 (4.70)	.00007 (4.70)	.00008 (1.50)
No. Observations	7,255	2,610	1,854
Pseudo R2	0.0730	0.2501	0.1072
Years	1991-2002	1998-2002	1995-98 1998-00 2000-02
Observed probability	0.0788	0.0835	0.0858
Estimated probability	0.0651	0.0386	0.0644

The sample is obtained considering in pair different waves of the SHIW (1991-93; 1993-95; 1995-98; 1998-00; 2000-2002). All households that in the first period are not entrepreneur according to the definition Entre2 are considered in the whole sample, pooled together. The dependent variable is equal to 1 if household becomes entrepreneur; equal 0 if household stay wage earners. Year dummies and provincial dummies are included. The personal characteristics refer to the member of the household who declares to be entrepreneur.

Table 4

THE PROBABILITY OF STARTING A BUSINESS: NET WEALTH IN QUARTILES

(pooled probit estimation - marginal effects - 1991-2002)

Variables	Model 1	Model 2	Model 3
Age	-.01061 (-4.02)	.00122 (0.33)	-.00782 (-1.48)
Age squared	.00011 (3.56)	-.00002 (-0.57)	.00008 (1.18)
High school – dummy	-.01891 (-2.84)	-.00125 (-0.16)	-.01756 (-1.43)
Graduate – dummy	-.00525 (-0.52)	.00720 (0.58)	-.00473 (-0.25)
Unemployed – dummy	-.01977 (-1.31)	.00142 (0.08)	-.03759 (-1.38)
Married – dummy	.00636 (0.70)	.02903 (3.07)	.01497 (0.86)
Male – dummy	.01424 (1.76)	.01134 (1.30)	.00144 (0.09)
No. of children	-.01519 (-4.32)	-.01314 (-3.15)	-.01655 (-2.45)
Household labour income	.00059 (1.75)	-.00019 (-0.48)	.00013 (0.21)
Self-employed parents – dummy	.03596 (5.89)	.02140 (2.81)	.04950 (4.18)
Graduate parents – dummy	.00472 (0.35)	.00970 (0.59)	.00164 (0.06)
Previous experience as self-employed – dummy		.20401 (15.3)	
Absolute risk aversion			-.03653 (-0.31)
Household net wealth 1st quartile coefficient of net wealth WN1	.00182 (0.94)	.00306 (1.46)	.00186 (0.59)
Household net wealth 2nd quartile coefficient of net wealth WN2	.00068 (2.25)	.00050 (2.21)	.00069 (1.96)
Household net wealth 3rdquartile coefficient of net wealth WN3	.00069 (2.41)	.00017 (1.71)	.00005 (0.28)
Household net wealth 4th quartile coefficient of net wealth WN4	.00015 (2.98)	.00011 (2.95)	.00012 (1.89)
Wald test WN1=WN4 – pvalue	0.3907	0.1562	0.5757
Wald test WN2=WN4 – pvalue	0.0839	0.0650	0.0772
Wald test WN3=WN4 – pvalue	0.0640	0.5210	0.5918
Wald test WN2=WN3 – pvalue	0.9779	0.0808	0.0306
No. Observations	7,255	2,610	1,854
Pseudo R2	0.0761	0.2525	0.1111
Years	1991-2002	1998-2002	1993-2002
Observed probability	0.0788	0.0835	0.0858
Estimated probability	0.0645	0.0383	0.0636

Year dummies and provincial dummies are included. The personal characteristics refer to the member of the household who declare to be entrepreneur. In model 3 we observe a strong reduction in the number of observation because of the great number of unanswered household to the question allowing us to measure risk aversion. Shift in the intercept according to quartiles of wealth is allowed only for model 1, as one coefficient of the dummies is significant; results are similar when dropping the dummies. For models 2 and 3 shift in the intercept according to quartiles of wealth is not allowed, as none of the coefficient is significantly different from zero.

Table 5

THE PROBABILITY OF STARTING A BUSINESS:
NET WEALTH IN QUARTILES - SOME EXERCISES
(pooled probit estimation - marginal effects - 1991-2002)

Variables	Model 1 instrumented net wealth (IV)	Model 1 young entrepreneurs	Model 1 interaction with enforcement	Model 1 interaction with rationing
Age	-.01263 (-4.60)	-.00603 (-0.35)	-.01047 (-3.98)	-.01089 (-4.14)
Age squared	.00013 (4.01)	.00006 (0.21)	.00011 (3.52)	.00011 (3.68)
High school – dummy	-.02530 (-2.92)	-.02173 (-1.68)	-.01812 (-2.74)	-.01815 (-2.73)
Graduate – dummy	-.01048 (-0.80)	.04978 (2.03)	-.00477 (-0.47)	-.00345 (-0.34)
Unemployed – dummy	-.01731 (-1.10)	-.04939 (-1.79)	-.02125 (-1.43)	-.02027 (-1.34)
Married – dummy	.00826 (0.88)	-.05338 (-2.64)	.00637 (0.70)	.00784 (0.86)
Male – dummy	.01494 (1.75)	.03335 (2.33)	.01379 (1.70)	.01507 (1.88)
No. of children	-.01386 (-3.75)	-.01843 (-2.55)	-.01534 (-4.37)	-.01518 (-4.29)
Household labour income		.00213 (2.88)	.00059 (1.76)	.00054 (1.60)
Self-employed parents – dummy	.03514 (5.36)	.07053 (5.46)	.03634 (5.96)	.03577 (5.82)
Graduate parents – dummy		.02122 (0.77)	.00462 (0.34)	.00636 (0.46)
Household net wealth 1st quartile coefficient of net wealth	.00084 (2.84)	.00930 (1.87)	.02379 (1.70)	
Household net wealth 2nd quartile coefficient of net wealth	.00066 (3.33)	.00205 (2.87)	.00372 (2.86)	
Household net wealth 3rd quartile coefficient of net wealth	.00061 (3.78)	.00022 (1.05)	.00156 (2.57)	
Household net wealth 4th quartile coefficient of net wealth	.00043 (3.46)	.00018 (2.28)	.00042 (1.65)	
Household net wealth 1st quartile Interaction with quantity recovered			-.00034 (-1.53)	
Household net wealth 2nd quartile Interaction with quantity recovered			-.00005 (-2.37)	
Household net wealth 3rd quartile Interaction with quantity recovered			-.00002 (-2.25)	
Household net wealth 4th quartile Interaction with quantity recovered			-.00000 (-0.95)	
Household net wealth – liquidity constrained household R1				.00066 (3.42)
Household net wealth – not liquidity constrained households R2				.00014 (4.53)
Wald test on R1=R2 (p-value)				0.0066
No. Observations	7,309	2,020	7,255	7,255
Pseudo R2	0.0442	0.1423	0.0771	0.0739
Years	1991-2002	1991-2002	1991-2002	1991-2002
Observed probability	0.0782	0.1015	0.0788	0.0788
Estimated probability	0.0698	0.0720	0.0643	0.0651

Year dummies and provincial dummies are included (regional dummies for IV estimation). The personal characteristics refer to the member of the household who declare to be entrepreneur. Shift in the intercept according to quartiles of wealth are not allowed, as they are never significant. Instruments for net wealth are inheritances-transfers, labour income and education of the parents; standard errors are not corrected for two-stage estimation in the IV estimation.

Table 6

THE SIZE OF THE BUSINESS AND INITIAL NET WEALTH

(Heckman estimation - 1991-2002)

Variables	Value of the business	No. of employees	Entrepreneurial income
Age	0.8665 (0.27)	0.3519 (1.57)	-0.2318 (-0.49)
Age squared	0.0017 (0.05)	-0.0371 (-1.44)	.00267 (0.50)
High school - dummy	1.3157 (0.15)	-0.1228 (-0.22)	2.0726 (1.93)
Graduate - dummy	-5.5708 (-0.50)	-0.8205 (-0.94)	5.2602 (2.96)
Married - dummy	-0.2445 (-0.02)	1.5534 (2.34)	1.1553 (0.84)
Male - dummy	20.595 (2.11)	-0.2888 (-0.45)	1.4297 (1.20)
Self-employed parents - dummy	10.521 (1.23)	-0.2098 (-0.36)	-2.0694 (-1.94)
Graduate parents – dummy	18.853 (0.76)	3.5713 (1.55)	6.8024 (2.53)
Household net wealth 1st quartile Change in the coefficient	-0.3366 (-0.15)	-0.0800 (-0.64)	-0.0601 (-0.20)
Household net wealth 2nd quartile Change in the coefficient	0.9042 (2.64)	0.0085 (0.30)	0.0197 (0.45)
Household net wealth 3rdquartile Change in the coefficient	0.4024 (1.11)	0.0312 (1.27)	0.0004 (0.01)
Household net wealth 4th quartile Change in the coefficient	0.0756 (1.19)	0.0101 (1.37)	0.0090 (0.96)
No. observations	7,304	7,306	7,311
No. uncensored observations	560	557	470
LR test of independent equations corr of the errors=0 - pvalue	0.0148	0.0003	0.0049
Years	1991-2002	1991-2002	1991-2002

Year dummies and provincial dummies are included. The personal characteristics refer to the member of the household who declare to be entrepreneur. For sake of saving space we drop the coefficients of change in the intercept in the 2nd, 3rd and 4th quartiles of net wealth. The coefficients of the selection equations are omitted. They are similar to the one presented in Table 4.

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