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HOUSEHOLD WEALTH AND ENTREPRENEURSHIP: IS THERE A LINK?

by Silvia Magri*

Abstract

In the absence of any correlation between wealth and entrepreneurial talent, initial net wealth should have an explanatory power in the decision to become an entrepreneur only for households that are financially constrained; further, its importance should decrease with wealth. I test these theoretical predictions for the Italian case, using the Survey of Household Income and Wealth. The evidence is that household's initial wealth is indeed important in the decision to become an entrepreneur and its effect is lower for the richest households. When net wealth is instrumented, the results are similar. Furthermore, the effect of net wealth is stronger when legal enforcement of the loan contract is weaker, as also predicted by the model. Finally, conditional on becoming entrepreneurs, initial household wealth does not significantly affect the size of the business. In summary, it seems that imperfections in capital markets can induce people to accumulate assets in order to facilitate the decision to become entrepreneurs.

JEL Classification: D13, E21,L26.
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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 United States (Quadrini, 1999; Gentry and Hubbard, 2004) and is true in Italy as well (Table 1a). There are two main explanations for this evidence. Being an entrepreneur can be at the origin of an increasing wealth. On the other hand, higher initial wealth may facilitate the decision to become an entrepreneur.

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

The theoretical framework for this debate is quite old. The theory developed by Knight at the onset of the past century (Le Roy and Singell, 1987) supports the view that people need to be wealthy before starting a business. The high uncertainty correlated with entrepreneurial activity causes market failures in providing the entrepreneurs with all the money they require. Therefore the entrepreneur also needs to be a capitalist. On the contrary, according to Schumpeter (1934), the entrepreneur and the capitalist have two distinct functions. Therefore, Schumpeter focuses on the entrepreneurial ability as the main prerequisite to become an entrepreneur, rather than on the low risk aversion, more emphasized by Knight.

From an empirical perspective, several contributions find evidence that net wealth is important in determining entrepreneurial income and the probability of becoming an entrepreneur (Evans and Jovanovic, 1989; Evans and Leighton, 1989; Fairlie, 1999; Gentry and Hubbard, 2004). This is also true when the endogeneity problem of household wealth is tackled, generally by using inheritances as instruments for wealth or directly in the estimation as a more exogenous substitute

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(Holtz-Eakin, Jouflain and Rosen, 1994a; Holtz-Eakin, Jouflain and Rosen, 1994b; Blanchflower and Oswald, 1998). Even in the United States and in the United Kingdom, financial constraints seem therefore to affect the birth of sole proprietorship. However, Hurst and Lusardi (2004) cast some doubts on this evidence. Using the Panel Study of Income Dynamics, they find that in the US the relationship between initial net wealth and the entry into entrepreneurship is flat for most of the wealth distribution; this relationship becomes positive and significant only at the top of the wealth distribution. Hurst and Lusardi (2004) argue that their findings are 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 US businesses, probably because the capital required for starting a business is generally small[2] and loans are widespread among entrepreneurs. In order to specifically explain their results, the authors notice that very wealthy households are more likely to have lower risk aversion and are therefore more willing to bear the high uncertainty that entrepreneurial activity entails; hence, wealth is likely to capture the effect of risk aversion, which is unobserved.

Actually, the main problem of the theoretical models analyzing the occupational choice of becoming an entrepreneur is that their implications are obtained assuming *no* correlation between net wealth and entrepreneurial talent; a similar consideration also holds for risk aversion, which is not even considered in these models that often assume risk neutrality. Because both entrepreneurial talent and risk aversion are often unobserved, a shock in these unobserved factors might influence both the decision of becoming an entrepreneur and net wealth. In this case, one can find a spurious correlation between net wealth and entrepreneurship, which is actually driven by a third unobserved factor, i.e. entrepreneurial talent and/or risk aversion. This is a very general problem that might spring from the endogeneity of net wealth.

In this paper I try to improve on this specific point. First, the Survey of Household Income and Wealth (SHIW) contains information that allows us to measure both entrepreneurial ability and risk aversion. Secondly, I also tackle the endogeneity problems by using some new instruments for net wealth, such as the size and the category of the house of residence.

Other contributions of the paper are the following. Hurst and Lusardi (2004) verify the existence of a non-linear impact of wealth on the decision to become an entrepreneur both by allowing a possible shift in the intercept, for different levels of household wealth, and a change in the slope,

[2]On this point see also Meyer (1990). However Gentry and Hubbard (2004) share a different view. They compare median household wealth and 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 in entry into entrepreneurship at all levels of wealth.

by introducing a polynomial in wealth (5 terms). In order to assess whether initial net wealth has a greater impact on the poorest households, rather than using a specific function (polynomial), this paper relies on a more flexible model, by allowing the coefficients of initial net wealth to be different for households belonging to the four different quartiles of the initial net wealth distribution. Furthermore, as a new feature of the model developed in Section 2, the borrowing constraint is linked to the enforcement costs of the loan contract. This permits us to obtain and test a prediction that household wealth is more important when enforcement costs are higher. To test this prediction, which also helps us to understand the way in which household wealth affects the decision to become an entrepreneur, regional data on the legal enforcement of the loan contract are used. Beyond these features, in this paper, unlike Hurst and Lusardi (2004) and more similarly to Gentry and Hubbard (2004), to test the different impact of the borrowing constraint in capital markets I condition the definition of entrepreneur on having a positive business value; the initial capital requirement cannot be trivial.

After controlling for learning entrepreneurial ability from one's own parents, the results are that initial net wealth is important in explaining the probability of becoming an entrepreneur. More interestingly, the importance of net wealth is lower for the richest households, as predicted by the model. When either using other controls for learning entrepreneurial ability or including a proxy for risk aversion, which considerably reduces the number of observations, the evidence is similar. The results also hold when household wealth is instrumented. As expected, net wealth is also more important for those households that live in regions with worse legal enforcement and for people who are rationed in the credit market. However, conditional on becoming an entrepreneur, net wealth actually has no effect on the size of the business; this is a new result given the data limitations encountered by previous empirical analysis.

The paper proceeds as follows. In Section 2, a simple theoretical model is developed to help to fix the idea about the predictions tested in the subsequent part of the paper. Section 3 presents the data, the variables and the estimation method used to test the predictions. Section 4 reports the results of the estimation aimed at shedding light on the link between household initial net wealth and the decision to become an entrepreneur. Sections 5 and 6 present respectively some extensions of the analysis and alternative specifications. Section 7 shows the results of the estimation on the link between initial net wealth and business size. 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 this paper, I rely on a simple one-period model, similar to the one developed in Evans and Jovanovic (1989) and Holtz-Eakin et al. (1994a); risk neutrality is assumed.[3] I add a few features. First, entrepreneurs can default.[4] Further, there is limited enforceability of the loan contract in the case of the borrower's default, which is actually at the origin of the credit constraint (Caggetti and De Nardi, 2006). These changes in the model permit us to obtain a prediction, based on the interaction between household initial wealth and legal enforcement, which helps in interpreting the results of the paper.

In this static model of occupational choice, the household is the unit of the analysis, principally because net wealth is measured at family level; moreover, the business is frequently 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 earning a wage with entrepreneurial income and then selects the occupation. For the wage earner the income is given by

$$Y^w = \mu x_1^{\lambda_1} x_2^{\lambda_2} \eta \tag{1}$$

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.$(1, \sigma_\eta^2)$

Entrepreneurial income is represented in the following way:

$$Y^e = \theta k^\alpha \epsilon \tag{2}$$

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

First, I 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)

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

[3] In both these models the imperfection in the capital market takes the form of a quantity constraint. In the model developed in Gentry and Hubbard (2004), capital market imperfection takes the form of a premium cost on external finance.

[4] 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.

where A is the household wealth endowment and r is the interest rate at which the 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 exist 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.[5] Specifically, in the model developed in this section, borrowing constraints stem from the assumptions that contracts are imperfectly enforceable (Caggetti and De Nardi, 2006). If the loan contract is not fully enforceable, lenders cannot force the debtors to entirely repay their loans. Therefore, borrowers will fully repay their loans only if it is in their own interest to do so. Since both lenders and borrowers are aware of this, the lender will only lend an amount, possibly equal to zero, which will be in the borrower's interest to repay as promised. In this model, the amount of the loan granted by the lender depends positively on household wealth A, which can be pledged as collateral: the higher the amount of household wealth A, the larger the sum that the bank is able to recover in the case of default, the lower the borrower's incentive to default and the larger the quantity of money that the bank is willing to lend. The amount of the loan is also positively linked to the degree of enforceability of the loan contract (Caggetti and De Nardi, 2006).

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

$$\lambda = \lambda(A, J) \tag{5}$$

and is positively linked to household wealth A and to the enforcement of the loan contract J ($\lambda_A > 0$ and $\lambda_J > 0$). 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 other assumptions on λ are supposed to hold: $\lambda_{AA} < 0$ and $\lambda_{AJ} < 0$. The third assumption $\lambda_{AA} < 0$ implies that the positive

[5] In Stiglitz and Weiss (1981), the borrowing constraint takes the form of a quantity constraint rather than an increase in the borrowing interest rate, because the bank return does not monotonically increase with the price of the loan. Banks may rationally avoid finding an equilibrium on the credit market through the interest rate, because 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).

marginal effect of net wealth on the amount of the loan decreases with net wealth: for low-asset households, an increase in the amount of wealth that can be invested in the business has a positive strong impact on the lender's attitude because the latter can partly seize the collateral in the case of default; for the very wealthy households, collateral is already there and in any case they are less likely to need a loan as they can finance entrepreneurial activity with their own wealth. The fourth assumption $\lambda_{AJ} < 0$ states that when legal enforcement J improves, so that the fraction of money that a lender can recover from the collateral increases, lenders can ask for a lower amount of collateral; therefore the link between collateral and the size of the loan is less strong. In this case collateral and enforcement are substitutes.

Hence, for a household that is financially constrained in the credit market, the maximum amount entrepreneurs are able to invest is equal to their wealth plus the loan:

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

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:

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

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 increases with net wealth only for households that are financially constrained.

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

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

then the household is never constrained. The amount required for the optimal capital is covered by the household's endowment of money and loans.

Including the optimal capital in the production function (2), I obtain the expected entrepreneurial

income in the two cases of unconstrained and constrained households.

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

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

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

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

Further, for constrained households, increasing net wealth has a decreasing positive impact on entrepreneurial earnings:

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

This second derivative has a negative sign because the first term is negative ($\alpha < 1$) as is the second 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.[6]

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

$$\max[\theta k^{\alpha} + r(A - k)] \geq \mu x_1^{\lambda_1} x_2^{\lambda_2} + rA \tag{12}$$

For unconstrained households, I substitute the optimal capital into (12) and I get (see Appendix,

[6]This is also true if $\lambda_{AA} = 0$, i.e. if there is a linear relationship between the loan and household wealth. Vice versa, should λ_{AA} be positive, this second derivative could have an ambiguous sign and increasing net wealth could have an increasing positive effect on entrepreneurial income and then on the probability of becoming an entrepreneur. The empirical results give insights on this point.

[7]The ability is observed. This assumption allows us to ignore problems arising from partial observability; it is also adopted in Caggetti and De Nardi (2006) and in Evans and Jovanovic (1989).

point 1 for details):

$$\mu^{1-\alpha}(1-\alpha)^{\alpha-1}\left(\frac{r}{\alpha}\right)^{\alpha}(x_1^{\lambda_1}x_2^{\lambda_2})^{1-\alpha} \leq \theta \leq \left(\frac{r}{\alpha}\right)[A+\lambda(A,J)]^{1-\alpha} \tag{12a}$$

An unconstrained household, for which the RHS inequality holds (see 8), will choose to become an 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 a wage earner. The LHS of the selection equation does not depend on household net wealth.

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

$$\theta > \max\left[\frac{r}{\alpha}[A+\lambda(A,J)]^{1-\alpha}; \mu x_1^{\lambda_1}x_2^{\lambda_2}[A+\lambda(A,J)]^{-\alpha} + r[A+\lambda(A,J)]^{1-\alpha}\right] \tag{12b}$$

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 an entrepreneur rather than a wage earner. The constrained household will choose to become an 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 required to select as an entrepreneur ($S3$) is actually lower that the level above which the household is financially constrained ($S2$); the situation is therefore analogous to the one presented in (12a) and the household is actually unconstrained in the credit market. Therefore, for the truly constrained households, the ability required to select as an entrepreneur ($S3$) is higher than ($S2$) ($S3 > S2$). This marginal entrepreneur is investing less than the optimal capital. In this case:

$$\frac{\partial S3}{\partial A} = \mu x_1^{\lambda_1}x_2^{\lambda_2}(-\alpha)[A+\lambda(A,J)]^{-\alpha-1}(1+\lambda_A) + r(1-\alpha)[A+\lambda(A,J)]^{-\alpha}(1+\lambda_A) < 0 \tag{13}$$

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

I finally try some comparative static by using changes in the level of legal enforcement. What happens to the impact of net wealth on entrepreneurial income when legal enforcement J improves?

The appropriate second derivative is:

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

This cross partial derivative is negative as the first term is negative because $\alpha < 1$ and the second term is also negative because λ_{JA} is negative by assumption (stronger legal enforcement reduces the importance of collateral for the bank, i.e. collateral and enforcement are substitutes). Hence, as 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 stronger. As pointed out in other studies (Bianco, Jappelli and Pagano, 2005; Bertola and Koeniger, 2004), 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 closely related to its initial net wealth. In both cases, initial household wealth has a greater role in explaining the decision to become an entrepreneur.[8]

In summary, the three predictions of this model, which are tested in the next sections, are the following.

1. The first prediction is that household initial net wealth should influence the selection as entrepreneurs only for liquidity constrained households. In a perfect capital market *and* if entrepreneurial ability is observed, the initial net wealth of potential entrants should not affect the selection decision.

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

3. The third prediction is that when the degree of legal enforcement increases, the importance of an increase in net wealth for entrepreneurial income and for the probability of becoming an entrepreneur should be lower.

[8]The cross-derivative is negative also if $\lambda_{JA} = 0$. Vice versa, should λ_{JA} be positive (collateral and legal enforcement are complements and not substitutes), this cross-derivative would have an ambiguous sign. It would be possible to find that as enforcement improves, household wealth becomes more important in influencing entrepreneurial income and therefore the selection into entrepreneurship. The empirical results give insights on this point.

It is important to stress that these predictions hold only if entrepreneurial ability and net wealth are *not* correlated, or in other words, if ability is observed. When the assumption of zero correlation between net wealth A and entrepreneurial ability θ does not hold, these conclusions are no longer true only for financially constrained households. In this case, there could be a correlation between net wealth and entrepreneurial income driven by a third unobserved factor. For instance, if there is a positive correlation between *unobserved* entrepreneurial ability and net wealth, a positive shock in ability will increase entrepreneurial income. At the same time, because of the positive correlation with ability, net wealth increases, for instance because more talented people accumulate more wealth. You therefore *observe* an increase in entrepreneurial earnings associated with an increase in net wealth. However, the second is not causing the first. A similar remark also holds for risk aversion, which is not even considered in the model that, as many other models, assumes risk neutrality.

In order to test empirically the theoretical predictions of the model developed in this section it is therefore *essential* to include in the estimations some proxies for entrepreneurial ability and risk aversion. This allows us to verify the impact of net wealth *given* entrepreneurial ability and risk aversion.

3 Data description and the estimation strategy

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

3.1 The definition of entrepreneur

In this 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 the self-employed is quite wide, including a) members of the arts and professions, 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 these categories could be defined as an entrepreneur (*entre1*). However, given the focus on access to capital and on the relevance of initial wealth, in this paper the preferred definition of entrepreneur

[9]For more details on the SHIW see http://www.bancaditalia.it/statistiche/indcamp/bilfait and for a comparison between the SHIW, National Accounts and Financial Accounts see the Methodological Notes in Supplements to the Statistical Bulletin (2008).

is that considering households that define themselves as self-employed and also declare a positive business value (*entre2*).[10] It is fruitful to concentrate on households with positive business values in order to isolate the self-employed who make significant up-front investments in their business (Caggetti and De Nardi, 2006; Gentry and Hubbard, 2004). In order to check for the existence of financial constraints, initial capital requirements need to be non-trivial.[11]

Table 1a reports the percentage of households that are entrepreneurs according to both the above-mentioned definitions. For robustness, I also use two other definitions of entrepreneurs: the first excludes members of the arts and professions (*entre3*); the second excludes members of the arts and professions and requires a positive business value (*entre4*). According to the *entre1* definition, roughly one fourth of the households in the sample, obtained pooling the 1989-2002 waves of the SHIW, are entrepreneurs; around 39 per cent when considering only working age (18-65) households. On the basis of the *entre2* definition these percentages decrease respectively to 16 per cent and 26 per cent for the working age (18-65) households. As in the United States, regardless of the definition, Italian entrepreneurs hold a high share of total net wealth. The concentration of wealth is the highest in the last quartile of net wealth, but is also not negligible in the first quartile (Table 1b).

3.2 The sample of new small entrepreneurs

Similarly to what has been done in other empirical papers (Hurst and Lusardi, 2004), I analyse a sample of households that are in two consecutive waves of the SHIW and are not entrepreneurs in the first period considered. I define a new entrepreneur as a household that becomes an entrepreneur in the subsequent period. Retirees and people aged less than 18 or more than 65 are excluded from the analysis; unemployed people are included. In order to increase the number of observations, I pool all the samples obtained by considering pairs of different waves of the SHIW (1989-91, 1991-93, 1993-95, 1995-98, 1998-2000, 2000-02). Our final sample is made up of more than 8,000 observations

[10] In detail, I use the business value of the firm declared in the survey that is equal to the value of the assets, such as equipment and goodwill excluding the buildings used in the business, plus the value of business equity for the active shareholders and partners.

[11] In the SHIW, around one third of the entrepreneurs defined as in *entre1* have a business value equal to 0 (compare with *entre2* in Table 1a). Hurst and Lusardi (2004) use the Panel Study of Income Dynamics (PSID) for the US and focus on households that report owning at least one business; therefore they define entrepreneurs as business owners, including professionals. However, they stress that 30 per cent of business owners report zero business equity (i.e. business assets-business loans; the PSID does not separately record the assets and the liabilities of households' business). Gentry and Hubbard (2004) analyse the households who own at least $5000 in actively managed business. Caggetti and De Nardi (2006) classify as entrepreneurs the households that declare that they are self-employed, own a business and have an active management role in it; by taking this intersection, they claim that their definition is likely to eliminate the self-employed that mostly invest in human capital, but very little in physical capital.

(Table 2). The weighted percentage of households that become entrepreneurs in the pooled sample is equal to 8.5 per cent for the *entre2* definition of entrepreneur, which is the one considered in the analysis.[12]

3.3 The explanatory variables

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 declared as self-employed are considered; generally, this is the spouse, less frequently a son or daughter. Household net wealth is measured as the sum of real and financial assets after subtracting liabilities; this is household net wealth *before* becoming an entrepreneur. In the estimation, I also include household labour income; this variable should control for any income effect in occupational choice.

In order to control for entrepreneurial ability θ, I include the possibility of informal learning and training that occur when growing up in a family business (Lentz and Laband, 1990; Holtz-Eakin et al., 1994a; Guiso and Schivardi, 2005). In detail, I use a dummy equal to 1 if one of the parents, either of the head or of the spouse, was self-employed; this is the specification called model 1 in Tables 3 and 4. As this first indicator can also capture the possibility of inheritance of a business, I use another measure of informal acquisition of the human capital required to run a business: I include a dummy equal to one if the household lives in an Italian industrial district (model 2 in Tables 3 and 4).[13] These industrial districts are areas defined by the presence of small-medium manufacturing firms, involved in the production of homogeneous products and coordinating their activity at various stages of the production process.[14] The idea is that in these areas it is easier to learn entrepreneurial ability.[15]

[12]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 4.5 per cent.

[13]However, not many family business are inherited. Using data from the SHIW in 1991, which had a specific section on this topic, roughly 20 per cent of family businesses were inherited. This share is higher than that calculated for the US, where very few businesses were inherited: Fairlie and Robb (2007) find that only 1.6 per cent of small businesses in the Characteristics of Business Owners Survey were inherited; slightly larger shares are obtained from the Federal Reserve's Survey of Small Business Finances (4 per cent) and the Survey of Consumer Finance (3.5 per cent); Lentz and Laband (1990) find that from a sample of larger independent businesses the share is higher at 14.2 per cent.

[14]Industrial districts are defined by the Italian Statistical Office (Istat); they amount to around 200. In order to maximize the sample size, in this model 2 I also drop the dummy for graduate parents that is never significant and is available for fewer observations.

[15]On similar lines, Ardagna and Lusardi (2008) use a dummy equal to 1 if the person knows someone who started a business in the recent past to capture what they call influences by social network.

To capture risk aversion, I include a measure of the Arrow-Pratt index of absolute risk aversion, as calculated in Guiso and Paiella (2003); this measure is available for a smaller sample (model 3 in Tables 3 and 4).[16] Despite the extent of non-response and the measurement error, this risk attitude indicator should capture individual willingness to bear risk. Specifically, Guiso and Paiella (2004) find that differences in the degree of risk aversion seem to explain sorting into riskier occupations such as being self-employed.

As control variables, I include several household characteristics that may influence the shape of the household utility function and its occupational choice. First, age is a measure of the attitude toward risk: individuals will try a riskier occupation, such as becoming an entrepreneur, when they are younger; age may also be an indicator of individual experience in the labour market. I 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, I take into account in the estimation a dummy for education, also for parents' education, gender and the status of unemployed. In all estimations I control for business cycles with year dummies; fixed effects for the 20 Italian regions are also included.

Table 2 presents descriptive statistics on the explanatory variables for the whole sample used in the estimations and the two sub-samples of households that become entrepreneurs or remain wage earners in the subsequent period. All the nominal variables are expressed at 1995 prices. The most significant differences between the two sub-samples refer to having self-employed parents, the number of children, the unemployed status, household labour income and its initial net wealth. When considering the self-employment and education dummy for parents (model 1), the sample decreases to roughly 7,000 observations as the variables referring to the parents are available only from 1991. As for the proxy for absolute risk aversion (model 3), this is available only for an even smaller sample of around 2,000 observations. The general characteristics of the households, as reported in Table 2, are not biased by the different size and periods of the samples considered in the estimations.

[16]The wording of the question is: "You are offered the opportunity of acquiring a security permitting you, with the same probability, either to gain 5,165 euros or to lose all the capital invested. What is the most you are prepared to pay for this security?".

4 The probability of becoming an entrepreneur and initial household wealth

This section is aimed at explaining the results concerning the probability of becoming an entrepreneur. Given the theoretical predictions of the model sketched in Section 2, the focus of the empirical exercise consists in verifying the explanatory power of initial household wealth in period t on household occupational decision in the following period *t+1*, after controlling for some relevant characteristics. Table 3 contains the results obtained with linear net wealth. Table 4 includes the results when the coefficient of net wealth is allowed to change for households belonging to the different quartiles of net wealth distribution.[17]

When considering model 1 (6,846 observations), as in many other studies referring mainly to the US and the UK, household initial net wealth has a positive and significant effect (Table 3, column 2). On the grounds of the theoretical model presented in Section 2, this result is traditionally interpreted as evidence of financial constraints. The economic impact is not trivial: by increasing net wealth by 100,000 euros, an admittedly strong increase compared to the average value of net wealth for the whole sample (Table 2), but also equal to one standard deviation of net wealth in the sample, the estimated probability of becoming an entrepreneur increases by 1.4 percentage points, i,e, by more than 20 per cent of the estimated probability (6.8 per cent).[18] When moving from the first quartile (12,000 euros) to the third quartile (147,000 euros) of net wealth distribution, the probability of becoming an entrepreneur increases by 2 percentage points (from 5.6 to 7.5 per cent).

To test the second prediction of the model in Section 2, that the importance of net wealth in alleviating liquidity constraints should be lower for the richest households, I allow the coefficient of net wealth to be different for households belonging to the four quartiles of net wealth distribution. In the second column of Table 4 (model 1), consistently with this prediction, the marginal effect of net wealth decreased as we go through higher quartiles of net wealth. More specifically, the coefficient of net wealth is the highest in the first quartile, though very imprecisely estimated. It is significant in the other quartiles and reaches its lowest value for the richest households, i.e. third and fourth quartiles of wealth. A Wald test, at the bottom of the table, shows that the coefficient in the second quartile is significantly different from the coefficients in the third and

[17] In all the estimations, I drop the observations for which household labour income and net wealth are lower than the 1st percentile and higher than the 99th percentile.

[18] In Hurst and Lusardi (2004), when net wealth increases by $\$100,000$, the probability of becoming an entrepreneur increases from 4.5 to 5 per cent; the corresponding marginal effect is hence equal to an increase by roughly 10 per cent.

fourth quartiles. As for the economic impact, when initial net wealth increases by 100,000 euros for the households in the second quartile of net wealth, the estimated probability of becoming an entrepreneur increases by 8 p.p. (at more than twice as much as the average estimated probability); the same probability increases by 2.7 and 1.9 p.p. respectively for households in the third and fourth quartiles of wealth.[19] The evidence is confirmed when similar unreported estimations are run on sub-samples of households belonging to different quartiles of net wealth, instead of using interaction terms as before: the estimation by samples split is more flexible as all the variables are allowed to have different coefficients in the different sub-samples. Furthermore, when the sample is split into just two groups, by using the median wealth, the marginal effect of net wealth is significantly higher (5 p.p.) for households whose wealth is lower than the median.[20]

The absence of a significant effect of initial wealth for the poorest households can be partly rationalized in this way. As argued by Fairlie (1999), for the poorest households an increase in net wealth would not be enough to make lenders willing to consider the household's loan application: small increases in their assets cannot be used to borrow substantially more money for start-up capital. Bester (1987) uses similar arguments: in his model of credit market with imperfect information, lenders may use collateral either to sort borrowers of different risk or as an incentive mechanism, because higher collateral forces borrowers to choose less risky projects. Exclusion from the credit market can occur if the borrowers' wealth that can be used as collateral is too small to allow perfect sorting or to create sufficiently strong incentives. Therefore, there may be a threshold (the first quartile of initial wealth in our sample is equal to 12,000 euros) under which initial wealth is too small to influence the lender's decision and hence the probability of becoming an entrepreneur.

As for the other household characteristics, it is worth stressing that the measure of entrepreneurial ability is highly significant (Table 3). The likelihood of transition into entrepreneurship is higher when one of the parents was self-employed: it increases by 3.9 percentage points, roughly half of the estimated probability (6.8 per cent). Further results are the following. An increase in the number of children (aged under 18) decreases the probability of becoming an entrepreneur, probably because of the need of a more stable income to support a family. The relationship between the probability of becoming an entrepreneur and age is U-shaped: the probability decreases for most of the age distribution, up to the age of 50, which is the 75 percentile.[21] This result is partly

[19] The second quartile of net wealth is between 12,000 and 75,000 euros; the third quartile is between 75,000 and 147,000 euros; the fourth quartile is between 147,000 and 642,000 euros. Data are expressed in 1995 prices.

[20] When the coefficient of net wealth is allowed to be different for households belonging to different deciles of wealth, the coefficient of net wealth still decreases as we move towards the richest households.

[21] In Holtz-Eakin et al. (1994b) the probability of becoming entrepreneur similarly decreases with age.

consistent with the interpretation that becoming an entrepreneur increases the income risk; this decision is therefore more likely to be taken when people are young. People who attain a higher level of education are less likely to enter entrepreneurship: a dummy for high school education has a negative coefficient. The effect of education on entrepreneurship in the empirical literature is rather mixed or weak (Ardagna and Lusardi, 2008; Fairlie, 1999); Johansson (2000) also finds that in a similar exercise for Finnish households, the coefficients of the dummy for higher education are all negative.[22]

In estimating model 2 (8,176 observations), I control for the possibility of informal acquisition of the entrepreneurial ability by including a dummy that is equal to 1 if the household lives in an industrial district. As expected, belonging to an industrial district has a positive effect on the probability of becoming an entrepreneur. The other results in Tables 3 and 4 are very similar to those commented for model 1. In an unreported estimation I also use as a measure of the entrepreneurial ability a dummy that is equal to 1 if people had previous experience of being self-employed. This variable is available since 1998 and therefore the number of observations is strongly reduced (Table 2). Age and education are no longer significant; however, for people that already had experience of self-employment the probability of transition into entrepreneurship greatly increases. More interestingly, a household's initial net wealth retains its positive and significant effect, but reduced in magnitude; this effect is still lower for the richest households.

In estimating model 3 (2,057 observations), I include a measure of household risk aversion and the same dummy as in model 1 to control for entrepreneurial ability. In column 4 of Table 3, the marginal effect of absolute risk aversion has the expected negative sign, but is very imprecisely estimated. Although it is reduced in magnitude, the marginal effect of the linear term of net wealth is still significant. When allowing the effects of net wealth to be different in the four different quartiles of net wealth (Table 4, column 4), the evidence is still that this effect decreases with wealth. The results for the other variables are similar.

Overall, the evidence in this section is that initial net wealth is important in influencing the selection as an entrepreneur. More interestingly, the marginal effect of net wealth decreases as net wealth grows. Net wealth matters mainly for households belonging to the second quartile of wealth distribution; its importance is lower for the richest households belonging to the third and fourth quartiles of wealth. The absence of a significant effect for the poorest households, belonging to the first quartile of wealth, in principle counters the theoretical predictions of the model, although this

[22] Johansson (2000) explains this result by saying that higher earning capacity, which is due to a higher educational level, discourages individuals from choosing the more risky path of self-employment.

can be explained by the existence of a wealth threshold effect.

5 The probability of becoming an entrepreneur: some extensions

5.1 Instrumental variable estimation

In this section I tackle some of the problems that can arise when estimating the probability of starting a business in the way done in the previous section. First, I consider that net wealth, even when using its value before the decision to become an entrepreneur, can be endogenous to the same decision; for instance, people may accumulate assets, foreseeing the future transition into entrepreneurship. More specifically, as already mentioned in Section 2, endogeneity arises if there are unobserved household features that are correlated with both net wealth and the household's propensity to start a business. This paper takes a step forward to avoid this problem, by trying to measure two of these unobserved features: entrepreneurial ability and risk aversion. However, if not accurately measured, these household features are included in the error term of the estimation and this might create an endogeneity problem for net wealth.

To overcome this problem, I follow other empirical papers and I instrument net wealth. The novelty regards the two instruments used for net wealth: the first is the size of the primary house in square meters and the second is the category of the house of residence (6 different categories from luxury to rural). Results are reported in Table 5, respectively in columns 2 and 3 for the first instruments and in columns 4 and 5 for the second instrument; I focus on model 1. These two instruments appear to have power as they have significant partial effects in the first regression for household net wealth (see the F test in the last panel of Table 5); therefore, the first condition for a valid instrument is satisfied. The second condition for a valid instrument is that the variable chosen as an instrument should not be correlated with the error term in the main equation. Unlike the first, this condition in a model with one endogenous variable and one instrument cannot be empirically tested (Wooldridge, 2002). Frequently, it is an argument from the economic theory that excludes the correlation. As for our estimation, there appears to be no specific economic reasons for both the size and the category of the house of residence to autonomously influence the decision to become an entrepreneur, i.e. excluding their indirect effect through net wealth. Furthermore, in some unreported estimations where both instruments are used together, a test of overidentifying restrictions, which can be used when there are more instruments than endogenous variables, never rejects the null hypothesis that the instruments are valid.

The evidence in Table 5 is that the marginal effect of instrumented net wealth on the probability

of becoming an entrepreneur is still significant and is even higher than before, more than double when net wealth is introduced in a linear way (columns 2 and 4). The higher coefficients of net wealth can be explained by the reduction in the attenuation bias, created by measurement error in wealth that should decrease when this variable is instrumented (Wooldridge, 2002). From the estimations that allow the effects of net wealth to be different for households belonging to different quartiles of wealth, it is still clear that the marginal effect of net wealth decreases for the richest households; similarly when observations are split according to the median value of household wealth (columns 3 and 5). Actually, when using the second instrument that also has power for the estimation referring to households in the first quartile of wealth (see the F test), household net wealth is significant for the poorest households as well; furthermore, it loses significance for the richest households in the third and fourth quartiles of wealth.

Finally, I also try with another very powerful instrument, a dummy for the number of bathrooms in the house of residence, which has very few chances of influencing the decision to become an entrepreneur. Unfortunately this variable is only available from 1993 and hence for a smaller sample: however, the unreported results for the whole sample and for the split according to the median value of household wealth are similar to those previously commented.

5.2 Sample selection

In this section I also consider the fact that selecting only those households that, for each pair of the SHIW, in the first period did not have a business may create a sample selection bias. In general, a household that does not start a business has a higher probability of being present in more than one year, while a household starting a business will be present only for the year when the decision is taken. More specifically, if a household is rich and has not yet decided to become an 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.

In order to tackle this problem, first I run the same estimation as in model 1 of Table 3 for each single year, considering therefore only households that are present in two consecutive surveys and that were not entrepreneurs in the first period. The result is that net wealth is significant in almost every year, excluding for the sample obtained from the period 2000-2002. Furthermore, Table 6 (column 3) reports the results of an estimation where, for the households that are present more than one year in the sample, I just keep the first observation available; as a consequence the sample size is halved (No=3,102 observations). As expected, the marginal effect of linear net wealth is

higher compared to that reported in Table 3 and, as shown in Table 6, is still much lower for the richest households. Results are also confirmed with an estimation where I keep all the observations, giving them a weight which is equal to the inverse of the number of times the household is present in the sample and the variance is corrected for the presence of repeated observations. Finally, I also try an estimation where I keep the households that are present just once in the sample, i.e. not interviewed again: the number of observations decreases even further and the same results hold.

As a second attempt to tackle this problem, I run the same estimation 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 for the first time a serious occupational choice problem; hence, self-selection should be less important. Moreover, if liquidity constraints are binding, they should be more severe for young people, who have less time to accumulate assets. In Table 6 (column 4), results obtained with model 1 (No=2,090) are similar to the previous ones: the coefficient of net wealth decreases, imprecisely estimated for the households in the first quartile of wealth, but strongly significant for those in the second quartile.

5.3 Legal enforcement

In this paragraph I verify the third prediction of the model presented in Section 2. Household initial net wealth should become less important in influencing the selection into entrepreneurship when legal enforcement of creditors' rights is higher. To test this hypothesis, I interact net wealth in its quartiles with a measure of the share of loan recovered in the case of a customer's default. This is an indicator of the quality of legal enforcement: the higher the share of the loan 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 (20 regions) and has no time variability; in other words, this is a ranking of the geographical legal enforcement in Italy at the beginning of the 1990s, which is considered fixed over the following years. The results, presented in Table 6 (column 2), are striking. The prediction is that when the quantity of the loan recovered in the case of default increases, net wealth should matter less. The evidence strongly conforms to this prediction. As shown by the coefficients of net wealth not interacted, net wealth is very important when the quantity of the loan recovered is equal to zero, especially for the households in the first and second quartiles of wealth. The importance of net wealth decreases as the recovered share increases: all the interaction terms have the expected negative sign.

[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.

A possible criticism in using the previous indicator is that the quality of legal enforcement closely matches Italy's North-South divide and that we are therefore picking up the effects of many omitted variables that characterize this geographical divide. However, this problem does not appear to be so important. First of all, the indicator used is not so strictly correlated with the North-South divide: the quantity of the loan recovered in the case of a borrower's default is similar in the North and the South (respectively 65 and 66 per cent) and lower in the central regions (57 per cent). Besides, an interaction term between household net wealth and the three area dummies in the period under analysis shows that the coefficient of wealth is similar across the three different areas of the country. Therefore legal enforcement seems to reflect some peculiar differences across regions, specifically connected to the recovery of the loan in the case of a borrower's default, and not capturing any omitted variable that affects differences across areas. Finally, I also run the same estimation as in Table 6 split for the three different areas of the country and the results hold for households living in the Centre and the South of Italy, where the legal enforcement indicator shows a higher variability.

5.4 Credit constraints

Finally, I verify whether net wealth is more important for households that define themselves as credit constrained. In the SHIW people were asked whether they applied for a loan and whether either a bank or a financial company turned them down. I define as credit constrained those households whose loan application is rejected or who received only a part of the money requested.[24] I estimate a regression where the coefficient of initial net wealth is allowed to change between the households that are borrowing constrained or not. The coefficient of initial net wealth is expected to be higher for the first group of households: this is actually the case and the difference is statistically significant (Table 6, column 5). Similarly, the coefficient of initial net wealth is higher for households who 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. However, the difference in the coefficients is not statistically significant.

[24]The questions of the SHIW 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.

6 Alternative specifications

In this section, I present the evidence obtained with alternative specifications in order to verify the sensitivity of the results commented on in the previous sections.

First, I verify the sensitivity of previous findings to an alternative definition of entrepreneurs. As mentioned in Section 3, in the previous analysis I consider entrepreneurs those households in which one of the members was self-employed and who declare a positive business value (*entre2*). To assess the existence of financial constraints, initial capital requirements need to be not trivial. In this paragraph, I change the definition and I consider as entrepreneurs all the households that have just a member that defines him or herself as self-employed, without requiring a positive 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 compared to the previous one: net wealth is more relevant for selecting into entrepreneurship for the richest households, along the same lines as in Hurst and Lusardi (2004). Specifically, in estimating model 1, the coefficient of net wealth increases from the third to the fourth quartiles of net wealth; furthermore, net wealth significantly influences the probability of becoming an entrepreneur only for the households belonging to the fourth quartile of net wealth; analogous results are obtained splitting the sample. Similarly, when instrumented, net wealth is significant only for the richest households. Therefore, in order to obtain the previous results for the probability of becoming entrepreneurs, I find it essential to condition the analysis on entrepreneurs declaring a business value greater than zero. It is difficult to talk about financial constraints if there are no equipment and goodwill to acquire, as in the case of one-third of entrepreneurs in the *entre1* definition (Table 1a).

In the same direction, I try an estimation of model 1 with the other two definitions of entrepreneurs. I exclude the members of the arts and professions and contingent workers, who do not really manage a business (*entre3*). For this second definition of entrepreneurs, I also focus on those households that declare a positive value for their business (*entre4*). Overall, the results for the probability of becoming an entrepreneur for model 1, estimated with *entre3* and *entre4*, are similar to those obtained with *entre1* and *entre2* respectively.

In all the estimations reported in the previous tables standard errors are corrected for the possible correlation among observations belonging to the same province, i.e. by controlling for neighboring effects. The main results also hold when standard errors are corrected for considering that there are repeated observations for the same household in the sample and therefore the errors may not be independent within the household. A panel estimation is not suitable, because when one

member of the household becomes an entrepreneur, the household immediately exits the sample; hence, as mentioned before, in the sample there are repeated observations only for households that never become entrepreneurs or enter entrepreneurship after several years of being interviewed in the SHIW.

I subsequently try an estimation of model 1 for the households that are continuously present in the SHIW respectively for the two periods 1989-1995 and 1995-2002. This estimation is interesting because it allows us to consider households that were not entrepreneurs in 1989 (1995), became entrepreneurs or did not in 1991 (1998) and, in the first case, continue as entrepreneurs in the following years (No=780 observations). I find that household wealth has an effect in influencing the probability of becoming and *continuing* as an entrepreneur: this effect decreases with wealth and is significant only for the households belonging to the second quartile of wealth, in line with the previous results.

As a robustness test I try another exercise as in Hurst and Lusardi (2004). In the dynamic model proposed by Buera (2003), the selection into entrepreneurship is influenced by accumulating net wealth in advance of starting a business, rather than by the level of net wealth itself. Hence, I include in the estimation the change in net wealth in the two years before the transition. In an unreported estimation, I find that the effect of changes in net wealth is significant for the households belonging to all quartiles of wealth; it decreases as we move to the richest households, although the differences are not significant at conventional levels. Furthermore, changes in net wealth matter for the transition only if they are greater than the third quartile of the distribution of the changes in net wealth (i.e. an increase of more than 35,000 euros).[25] As mentioned before, this result could be explained with the idea expressed in Fairlie (1999) that small increases in assets are not sufficient to borrow substantially more money for start-up firms.

As a final analysis of the robustness of the results, I try another estimation where I 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 who is more important from an economic point of view. Results are similar for the estimation of model 1.

[25]The median value of the change in net wealth is 3000 euros as most of the values in the first part of the distribution, under the median, are negative changes in net wealth.

7 Initial household wealth and the size of the business

This section is aimed at verifying the impact of initial household net wealth on the size of the business, conditional on becoming an entrepreneur. It could be argued that financial constraints do not only hamper the decision to become an entrepreneur, but may also entail the creation of undersized businesses. Due to data limitations, this issue was seldom explored in previous empirical papers (Hurst and Lusardi, 2004). The SHIW contains two possible measures of the size of the business: the first is the number of people employed in the business, while the second is the market value of the firm, which is the sum of the value that the household is required to assign to equipment and goodwill, excluding the buildings used in the business, and the share of the market value for active shareholders and partners. The former is the preferred measure because it is less likely to be affected by measurement error.

As the size of the business can be observed only for people becoming entrepreneurs, a typical sample selection problem arises, which could bias the results if the correlation between the errors in the probability model and in the size model is different from zero. In this section, I 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; independent estimations of business size only for people that become entrepreneurs could bias the results. In the Heckman estimation, I use the following identification conditions, i.e. exclusion restrictions. I exclude from the estimation of business size the number of children younger than 18 and the unemployment status, because these two variables should only play a role in the selection as entrepreneurs, but they should not affect business size.

In Table 7 results are reported both for the specification with linear wealth and with the coefficient of wealth allowed to change for households in different quartiles of wealth. Due to the reduction in the number of observations, for the estimation of business size I control for the unobserved geographical heterogeneity with three area dummies, rather than with 20 regional dummies. To avoid a further reduction in the number of observations, I present the results obtained with the estimation of model 2 as defined before, which has the largest sample size; more or less analogous results hold for models 1 and 3. Overall, the selection equation of the Heckman model gives similar results to the ones presented in previous sections, which are not reported here.

Columns 2 and 3 of Table 7 present the results for business size measured by the number of employees in the business, while columns 4 and 5 contain the results for the size measured by

market value of the business. After dropping some outliers for the dependent variable,[26]the main finding is that an increase in linear net wealth does not influence the size of the business, even when instrumented (unreported). When the coefficients of net wealth are allowed to change for quartiles of net wealth the evidence is fairly similar; however, even in this case the coefficient of net wealth decreases with wealth. The main factors influencing the size of the business are household labour income, with a positive sign, and the graduate dummy which has a negative impact on the number of employees: this may reflect the role of professionals, such as lawyers and doctors, whose business size is normally limited to that of their offices, which is expected to be smaller compared with the size of a typical firm; when professionals are excluded (by using the definition *entre4*), the negative impact of the graduate dummy vanishes. The value of the business is also higher for male entrepreneurs.

Overall, the results of this section suggest that once the households have decided to become entrepreneurs, giving more wealth to them seems to have no impact on the size of the business; if any, there is an effect only for households belonging to the second quartile of wealth. The economic variable that appears to influence the size of the business is household labour income.[27]

8 Final remarks

The evidence in this paper is in favour of the importance of initial household wealth for starting a business. Imperfections in financial markets, at least in the form of the quantity constraint as in the model analysed in this paper, can therefore induce people to accumulate assets before becoming and in order to become entrepreneurs. This can partly explain the high concentration of net wealth among entrepreneurs.

Consistently with the theoretical predictions of the model presented in Section 2, the importance of net wealth for selecting into entrepreneurship decreases as net wealth grows, i.e. for the richest households. The impact of net wealth is also stronger both when legal enforcement is lower and for households whose loan applications have been rejected by banks. However, conditional on becoming an entrepreneur, net wealth has essentially no impact on the size of the business, which seems more influenced by household labour income.

This evidence is consistent with the fact that debt used for business purposes is not very

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

[27]Angelini and Generale (2008) find that financial constraints cannot be the main determinant of the evolution over time of the firm size distribution, especially in financially developed economies.

widespread among small Italian entrepreneurs (Magri, 2009). Using data from the SHIW, more than 60 per cent of new entrepreneurs only use internal finance to run their businesses and only around a quarter have a bank loan for business purposes. The amount of the loan is also quite modest. Conditional on being entrepreneurs with positive business value (*entre2*), the average value of the business is around 64,000 euros, while the average value of gross bank debt for business purposes is roughly 6,600 euros, while the median value is zero.

Appendix

Point 1

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

$$\theta^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r}\right)^{\frac{\alpha}{1-\alpha}} - r\left(\frac{\alpha}{r}\right)^{\frac{1}{1-\alpha}}\theta^{\frac{1}{1-\alpha}} \geq \mu x_1^{\lambda_1} x_2^{\lambda_2} \tag{a1}$$

then considering that

$$r r^{\frac{-1}{1-\alpha}} = r^{\frac{-\alpha}{1-\alpha}} \tag{a2}$$

the inequality in (a1) becomes

$$\theta^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}}\left[\alpha^{\frac{\alpha}{1-\alpha}} - \alpha^{\frac{1}{1-\alpha}}\right] \geq \mu x_1^{\lambda_1} x_2^{\lambda_2} \tag{a3}$$

Taking into account that

$$\alpha^{\frac{1}{1-\alpha}} = \alpha\alpha^{\frac{\alpha}{1-\alpha}} \tag{a4}$$

then (a3) is equal to

$$\theta^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}}(1-\alpha) \geq \mu x_1^{\lambda_1} x_2^{\lambda_2} \tag{a5}$$

Raising both sides to the power $(1-\alpha)$, I get

$$\theta r^{-\alpha}\alpha^{\alpha}(1-\alpha)^{1-\alpha} \geq \mu^{1-\alpha}(x_1^{\lambda_1} x_2^{\lambda_2})^{1-\alpha} \tag{a6}$$

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

Point 2

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

$$\theta[A + \lambda(A,J)]^{\alpha} - r[A + \lambda(A,J)] \geq \mu x_1^{\lambda_1} x_2^{\lambda_2} \tag{a7}$$

and therefore

$$\theta \geq r[A + \lambda(A, J)]^{1-\alpha} + \mu x_1^{\lambda_1} x_2^{\lambda_2} [A + \lambda(A, J)]^{-\alpha} \tag{a8}$$

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

Point 3

Consider the following derivative in (13)

$$\frac{\partial S3}{\partial A} = \mu x_1^{\lambda_1} x_2^{\lambda_2} (-\alpha)[A + \lambda(A, J)]^{-\alpha-1}(1 + \lambda_A) + r(1 - \alpha)[A + \lambda(A, J)]^{-\alpha}(1 + \lambda_A) \tag{a9}$$

This derivative can be written as

$$-\alpha\{\mu x_1^{\lambda_1} x_2^{\lambda_2} [A+\lambda(A, J)]^{-\alpha} + r[A+\lambda(A, J)]^{1-\alpha}\}[A+\lambda(A, J)]^{-1}(1+\lambda_A) + r[A+\lambda(A, J)]^{-\alpha}(1+\lambda_A) \tag{a10}$$

You can also write

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

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

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

Substituting the expression in $S2$, you obtain

$$-\alpha\left\{\frac{r}{\alpha}[A + \lambda(A, J)]^{1-\alpha}\right\}[A + \lambda(A, J)]^{-1}(1 + \lambda_A) + r[A + \lambda(A, J)]^{-\alpha}(1 + \lambda_A) \tag{a13}$$

that is equal to zero.

Therefore (a11) is negative and so is the derivative in (a9). When net wealth increases, $S3$ is lower and closer to S2; therefore, the acceptance region to select into entrepreneurship increases with wealth for constrained households.

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Tables and figures

Table 1a: Entrepreneurship and wealth concentration

Definition of entrepreneurs	Percentage of entrepreneurs	Percentage of working age entrepreneurs	Percentage of net wealth held by entrepreneurs
Entre1	24.5	38.6	61.5
Entre2	16.2	25.6	48.4
Entre3	19.7	31.1	49.7
Entre4	14.3	22.5	42.7

Table 1b: Entrepreneurship and wealth concentration by wealth distribution

Net wealth distribution	Percentage of entrepreneurs	Percentage of working age entrepreneurs	Percentage of net net wealth held by entrepreneurs
Overall	16.2	25.6	48.4
Quartiles			
1 quartile	2.5	4.7	9.1
2 quartile	10.5	20.1	20.4
3 quartile	16.3	26.9	27.9
4 quartile	35.4	48.4	58.4
Top part of the distribution			
80-90 percentile	22.2	34.4	34.4
90-95 percentile	37.6	50.1	50.3
95-100 percentile	55.5	71.1	75.3

Source: excluding the second column in Table 1a, data refer to working age (18-65) households from the pooled data of the SHIW 1989-2002 (29,571 observations); sampling weights are used. Definition *Entre1* applies if one of the member of the household belongs to: a) members of the arts and professions, b) sole proprietors, c) free-lancers, d) owners or members of a family business, e) active shareholders and partners, f) contingent workers. *Entre2* if *Entre1* and the household declares a positive business value. Definition *Entre3* is analogous to *Entre1* excluding from the definition a) members of the arts and profession and f) contingent workers. Definition *Entre4* is like *Entre3* and the household declares a positive business value. Statistics in Table 1b refer to *Entre2*.

Table 2: Descriptive statistics
(average values)

Variables	Whole sample	Staying as wage earners A	New entrepreneurs B	p-value of the difference
	N=8,604	N=7,930	N=674	A-B=0
Becoming an entrepreneur (dummy)	0.085			
Value of the business (a) (000 euros)			64.0	
Value of the business (b) (000 euros)			54.9	
No. of employees			5.2	
Age	42.07	42.00	42.81	0.1487
High School (dummy)	0.349	0.352	0.316	0.1762
Graduate (dummy)	0.106	0.102	0.149	0.0101
Unemployed (dummy)	0.036	0.037	0.017	0.0012
Married (dummy)	0.819	0.818	0.829	0.6507
Male (dummy)	0.809	0.805	0.850	0.0312
No. of children	0.976	0.989	0.839	0.0063
H.hld initial net wealth (000 euros)	110.57	104.40	177.00	0.0000
H.hld labor income (000 euros)	18,92	18,71	21.16	0.0001
District (dummy)	0.196	0.192	0.235	0.0941
Self-employed parents (dummy)	0.412	0.397	0.563	0.0000
	N=7,479	N=6,869	N=610	
Graduate parents (dummy)	0.056	0.052	0.097	0.0078
	N=7,240	N=6,644	N=596	
Previous self-employed (dummy)	0.276	0.233	0.756	0.0000
	N=3,000	N=2,759	N=241	
Absolute risk aversion	0.154	0.155	0.147	0.2096
	N=2,225	N=2,047	N=178	

Source: the sample is obtained considering in pairs different waves of the SHIW (1989-1991 1991-93; 1993-95; 1995-98; 1998-00; 2000-2002). H.hld means household. All households that in the first period are not entrepreneurs according to the definition *Entre2* are considered in the whole sample, pooled together. Those staying as wage earners do not become entrepreneurs in the second period. New entrepreneurs become entrepreneurs in the second period. The statistics refer to the whole sample, before any cleaning for the estimations; the variables reported in the last rows are missing in some surveys (used in model 1 and model 3 of Tables 3 and 4). Data are weighted using SHIW sampling weights. All the nominal variables are expressed at 1995 prices. In the column for new entrepreneurs there are indications for two measures of the business size used in Section 7; the value of the business includes (a) and excludes (b) the value of the firm for active shareholders and partners.

Table 3: The probability of starting a business: linear net wealth
(pooled probit estimation - marginal effects)

Variables	Model 1		Model 2		Model 3	
Age	-.0102	***	-.0085	***	-.0031	
	(.0033)		(.0027)		(.0047)	
Age squared	.0001	***	.0001	***	.0000	
	(.0000)		(.0000)		(.0001)	
High school - dummy	-.0197	***	-.0166	**	-.0188	*
	(.0075)		(.0067)		(.0095)	
Graduate - dummy	-.0051		.0008		-.0087	
	(.0113)		(.0109)		(.0155)	
Unemployed - dummy	-.0161		-.0213		-.0337	
	(.0136)		(.0120)		(.0171)	
Married - dummy	.0053		.0051		.0084	
	(.0092)		(.0086)		(.0143)	
Male - dummy	.0113		.0185	**	.0036	
	(.0095)		(.0082)		(.0154)	
No. of children	-.0125	***	-.0123	***	-.0115	*
	(.0036)		(.0030)		(.0062)	
Household labour income (000 euros)	.0003		.0004		.0001	
	(.0004)		(.0004)		(.0007)	
Self-employed parents - dummy	.0392	***			0465	***
	(.0067)				(.0103)	
Graduate parents - dummy	.0062				-.0019	
	(.0191)				(.0264)	
District - dummy			.0147	*		
			(.0088)			
Absolute risk aversion					-.0046	
					(.1208)	
Household net wealth (000 euros)	.00014	***	.00015	***	.00008	*
	(.00003)		(.00002)		(.00005)	
No. observations	6,846		8,176		2,057	
Pseudo R^2	0.0447		0.0370		0.0747	
Period	1991-2002		1989-2002		1993-2002	
Observed probability	0.0762		0.0736		0.0729	
Estimated probability	0.0679		0.0668		0.0594	

The sample is obtained considering in pairs different waves of the SHIW (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. The dependent variable is equal to 1 if the household becomes an entrepreneur; equal to 0 if the household remains a wage earner. Year dummies and 20 regional dummies are included. The personal characteristics refer to the member of the household who declares he or she is an entrepreneur. In model 1 entrepreneurial ability is measured with a dummy equal to 1 if the parents were self-employed and also with a measure of the parents' education; in model 2 entrepreneurial ability is captured with a dummy equal to 1 if the household belongs to an industrial district; model 3 is like model 1 with a measure of household risk aversion. Robust standard errors are in brackets; they are adjusted for 95 clusters in provinces. * indicates significant at 10%, ** at 5% and *** at 1%.

Table 4: The probability of starting a business: net wealth in quartiles
(pooled probit estimation - marginal effects)

Variables	Model 1		Model 2		Model 3	
Age	-.0103	***	-.0087	***	-.0027	
	(.0032)		(.0027)		(.0046)	
Age squared	.0001	***	.0001	***	.0000	
	(.0000)		(.0000)		(.0001)	
High school - dummy	-.0193	**	-.0164	**	-.0187	*
	(.0074)		(.0067)		(.0094)	
Graduate - dummy	-.0053		.0006		-.0091	
	(.0112)		(.0107)		(.0149)	
Unemployed - dummy	-.0138		-.0196		-.0318	
	(.0135)		(.0119)		(.0176)	
Married - dummy	.0051		.0046		.0083	
	(.0091)		(.0086)		(.0144)	
Male - dummy	.0109		.0182	**	.0039	
	(.0093)		(.0081)		(.0150)	
No. of children	-.0123	***	-.0121	***	-.0108	*
	(.0035)		(.0030)		(.0061)	
Household labour income (000 euros)	.0003		.0004		.0001	
	(.0004)		(.0004)		(.0007)	
Self-employed parents - dummy	.0392	***			0471	***
	(.0067)				(.0102)	
Graduate parents - dummy	.0061				-.0024	
	(.0187)				(.0260)	
District - dummy			.0143	*		
			(.0087)			
Absolute risk aversion					-.0095	
					(.1185)	
Household net wealth 1st quartile WN1 (000 euros)	.00271		.00118		.00329	
	(.00183)		(.00176)		(.00275)	
Household net wealth 2nd quartile WN2 (000 euros)	.00080	***	.00070	***	.00079	**
	(.00020)		(.00018)		(.00035)	
Household net wealth 3rd quartile WN3 (000 euros)	.00027	***	.00024	***	.00013	
	(.00010)		(.00010)		(.00016)	
Household net wealth 4th quartile WN4 (000 euros)	.00019	***	.00018	***	.00013	**
	(.00003)		(.00003)		(.0001)	
Wald test WN2=WN3 p-value	.0017		.0011		0372	
Wald test WN2=WN4 p-value	.0012		.0012		.0492	
Wald test WN3=WN4 p-value	.3316		.4471		.9910	
No. observations	6,846		8,176		2,057	
Pseudo R^2	0.0479		0.0397		0.0801	
Period	1991-2002		1989-2002		1993-2002	
Observed probability	0.0762		0.0736		0.0729	
Estimated probability	0.0673		0.0663		0.0584	

Table 5: The probability of starting a business: instrumented net wealth

estimations run separately for households in different quartiles of net wealth
(pooled probit estimation - marginal effects and coefficients)

Variables	Model 1 IV 1*		Model 1 IV 1*		Model 1 IV 2*		Model 1 IV 2*	
H.hld wealth	.00040	***			.00049	***		
	[.00305]				[.00366]			
	(.00054)				(.00110)			
H.hld wealth 1q			.05431				.04496	**
WN1			[.55405]				[.46942]	
			(.56621)				(.23138)	
H.hld wealth 2q			.01332	*			.00736	*
WN2			[.10213]				[.05591]	
			(.05648)				(.03251)	
H.hld wealth 3q			.00293	*			-.00086	
WN3			[.02365]				[-.00685]	
			(.01373)				(.02196)	
H.hld wealth 4q			.00070	***			.00049	
WN4			[.00447]				[.00313]	
			(.00131)				(.00334)	
H.hld wealth < median			.00577	***			.00400	***
WN B			[.04923]				[.03426]	
			(.01708)				(.01080)	
H.hld wealth > median			.00050	***			.00018	
WN A			[.00353]				[.00129]	
			(.00080)				(.00222)	
Wald test WN2=WN3			0.1773				0.0564	
Wald test WN2=WN4			0.0838				0.0719	
Wald test WN3=WN4			0.1648				0.4839	
Wald test WN B=WN A			0.0075				0.0012	
First-stage estimation	IV 1*		IV 1*		IV 2*		IV 2*	
Test F on instrument								
Hs wealth	.0000				.0000			
WN1			.1410				.0000	
WN2			.0194				.0000	
WN3			.0000				.0000	
WN4			.0000				.0000	
WN B			.0000				.0000	
WN A			.0000				.0000	
No. observations	6,849		6,849		6,835		6,835	
Period	1991-2002		1991-2002		1991-2002		1991-2002	

The sample is the same as in Table 3 for model 1. In the first row marginal effects are reported; coefficients are in square brackets and robust standard errors adjusted for 95 clusters in the provinces are in round brackets. In model IV 1* the instrument for net wealth is the size of the house in square meters, while in model IV 2* the instrument is the category of the house (there are 6 different categories of house from luxury to rural). Test F on instrument tests that the instrument is statistically significant in the first stage regression for net wealth; P-value is reported. Year dummies and area dummies are included. H.hld means household and q refers to quartile of wealth; household net wealth is expressed in 000 euros. * indicates significant at 10%, ** at 5% and *** at 1%.

Table 6: The probability of starting a business: some extensions
(pooled probit estimation - marginal effects)

Variables	Model 1 enforcement		Model 1 no repeated obs		Model 1 young		Model 1 rationed	
Age	-.0100	***	-.0098	*	-.0014		-.0101	***
	(.0032)		(.0055)		(.0181)		(.0028)	
Age squared	.0001	***	.0001		.0000		.0001	***
	(.0000)		(.0001)		(.0000)		(.0000)	
High school	-.0192	**	-.0413	***	-.0257	**	-.0195	***
	(.0073)		(.0140)		(.0124)		(.0066)	
Graduate	-.0055		-.0240		.0305		-.0044	
	(.0111)		(.0174)		(.0257)		(.0107)	
Unemployed	-.0158		-.0385	*	-.0429		-.0161	
	(.0130)		(.0183)		(.0195)		(.0143)	
Married	.0048		.0157		-.0437	**	.0064	
	(.0090)		(.0169)		(.0214)		(.0099)	
Male	.0103		-.0005		.0286	*	.0114	
	(.0093)		(.0184)		(.0138)		(.0084)	
No. of children	-.0125	***	-.0086		-.0173	**	-.0126	***
	(.0035)		(.0065)		(.0069)		(.0037)	
H.hld labour income (000 euros)	.0003		.0009		.0012		.0003	
	(.0004)		(.0007)		(.0008)		(.0004)	
Self-employed parents	.0391	***	.0493	***	.0627	***	.0389	***
	(.0066)		(.0109)		(.0137)		(.0066)	
Graduate parents	.0058		-.0039		.0165		.0066	
	(.0186)		(.0301)		(.0328)		(.0151)	
WN1 (000 euros)	.0290	**	.0023		.0041			
	(.0129)		(.0032)		(.0045)			
WN2 (000 euros)	.0051	***	.0011	***	.0016	**		
	(.0013)		(.0004)		(.0008)			
WN3 (000 euros)	.0022	***	.0004	**	.0002			
	(.0006)		(.0002)		(.0002)			
WN4 (000 euros)	.0008	***	.0003	***	.0002	**		
	(.0002)		(.0001)		(.0001)			
*WN1 *quantity recovered*	-.0004	**						
	(.0002)							
*WN2 *quantity recovered*	-.0001	***						
	(.0000)							
*WN3 *quantity recovered*	-.0000	***						
	(0.000)							
*WN4 *quantity recovered*	-.0000	***						
	(.0000)							
*H.hld wealth * rationed R1*							.0005	**
							(.0002)	
*H.hld wealth * not rationed R2*							.0001	***
							(.0000)	
Wald test R1=R2 p-value							0.0950	
No. observations	6,846		3,102		2,090		6,846	
Pseudo R^2	0.0512		0.0508		0.0936		0.0453	
Period	1991-2002		1991-2002		1991-2002		1991-2002	
Observed probability	0.0762		0.1099		0.0889		0.0762	
Estimated probability	0.0666		0.0988		0.0702		0.0678	

Table 7: The size of the business and initial net wealth
(Heckman estimation)

Variables	No. employees		No. employees		Value business		Value business	
Age	.1602		.1441		-.5534		-.6850	
	(.1499)		(.1551)		(2.654)		(2.624)	
Age squared	-.0020		-.0018		.0129		.0145	
	(.0017)		(.0017)		(.0311)		(.0308)	
High school	-.3441		-.3810		1.366		.9480	
	(.5660)		(.5691)		(8.111)		(7.978)	
Graduate	-1.419	**	-1.509	**	-13.00		-14.04	
	(.6041)		(.6218)		(10.07)		(9.878)	
Married	.8409		.7659		.2537		-.5130	
	(.5927)		(.5945)		(13.24)		(13.08)	
Male	-.0581		-0272		13.50	**	14.40	**
	(.7083)		(.7099)		(6.621)		(6.630)	
H.hld labour income (000 euros)	.0855	**	.0887	**	.5652	*	.5923	*
	(.0349)		(.0350)		(.3040)		(.3108)	
District - dummy	.8583		.8045		7.428		6.972	
	(.6732)		(.6769)		(8.998)		(8.803)	
Household net wealth (000 euros)	.0035				.0402			
	(.0030)				(.0375)			
WN1 (000 euros)			.0224				.4270	
			(.1022)				(1.797)	
WN2 (000 euros)			.0304	**			.3075	
			(.0148)				(.2019)	
WN3 (000 euros)			.0099				.1036	
			(.0072)				(.1059)	
WN4 (000 euros)			.0049				.0568	
			(.0033)				(.0443)	
Wald test WN2=WN3 p-value			.1593				.2460	
Wald test WN3=WN4 p-value			.4425				.5684	
Wald test WN2=WN4 p-value			.0695				.1812	
No. observations	8,177		8,177		8,170		8,170	
No. uncensored observations	592		592		590		590	
Period	1989-2002		1989-2002		1989-2002		1989-2002	
Wald test of indepedent equations p-value	0.0093		0.0076		0.0060		0.0089	

The value of the business includes equipment and goodwill and the share of market value for active shareholders and partners. Year and area dummies are included; regional dummies for unreported selection equation that is omitted as the coefficients are similar to the ones presented in Tables 3 and 4. Robust standard errors are in brackets; they are adjusted for 95 clusters in provinces. * indicates significant at 10%, ** at 5% and *** at 1%.

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