# Learning Entrepreneurship from other Entrepreneurs?*

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**Abstract**

We document that individuals living in provinces with a higher density of firms at the time they were growing up are more likely when adult to choose an entrepreneurial job. This holds even accounting for the density of firms in their current location. Conditional on becoming entrepreneurs, people exposed in youth to an environment dense of firms tend to earn higher income from business and these firms are on average more productive even after factoring in any spillover that may derive from facing today an environment rich of entrepreneurs. Indeed, density at entrepreneur's young age is more important than current density for firm performance. Moreover, the effect persists even in the sample of entrepreneurs currently located in a different area compared to the one they grew up in. These results are not driven by firms density capturing better excess to external finance as they survive controlling for a measure of local financial development, currently and at young entrepreneurs age. They are instead consistent with entrepreneurial capabilities being at least partly learnable and learnibility being a social process. Consistent with this interpretation we find that entrepreneurs that at the age of 15-18 lived in areas with a higher firm density adopt later in life better managerial practices which correlate with firms productivity.

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# 1 Introduction

Who becomes an entrepreneur? The answer economists give to this question is that individuals choose their occupation by comparing the costs and benefits of alternative jobs. In the classical Lucas (1978)/Rosen (1982) model of occupational choice, individuals with greater managerial skills - defined as the ability to extract output from a given combination of capital and labor - will sort into entrepreneurship because the return from managing a firm exceeds the wage they can earn working as employees. While entrepreneurial skills can be interpreted more broadly to include, for instance, the ability to manage (and stand) risk and that of identifying and assessing the economic potential of a new product or process, it is unclear how people obtain these skills. Are they innate characteristics or are instead acquired through learning? And if so, how?

Distinguishing between these two sources of skill acquisition is of practical importance. If entrepreneurial ability is innate, then its distribution should not differ substantially across populations and much of the observed differences in entrepreneurship across countries or regions within countries should be traced to factors that facilitate or discourage people with entrepreneurial abilities to set up a firm - such as the availability of capital. Fostering entrepreneurship then requires removing these obstacles. If instead managerial abilities can be acquired through learning, differences in entrepreneurship can partly reflect differences in learning opportunities across countries or regions and the constraint to entrepreneurship rests in the availability of entrepreneurial abilities. Fostering entrepreneurship requires improving the learning process.

In this paper we investigate whether selection into entrepreneurship and entrepreneurs' ability are affected by learning opportunities. While individuals can learn how to be an entrepreneur (and how to be a successful one) in a variety of ways (from parents, friends, schools, etc.) and at different stages of their life cycle, in this paper we look at the specific channel of learning from one's environment (geography) during formative years (adolescence). For example, for a young individual growing in Silicon Valley it should be easier than elsewhere to learn how to set up and run a firm because of the density of entrepreneurial activities in the area. In this paper we test whether these intuitive predictions receive empirical support in Italian data. In particular, we test whether the number of "data points" an individual can learn from (as measured by the firm density where she grew up) affects

her choice of becoming an entrepreneur and whether the density of firms in the early phase of an entrepreneur's life affects subsequent performance as an entrepreneur.

We study these questions using a variety of data sets. The first is a sample of Italian entrepreneurs actively managing a small incorporated firm (the ANIA sample). It contains detailed information on the entrepreneur's place of birth, current location and location at age 15-18 (which we term the "learning age"), besides a rich set of demographic variables. We match these entrepreneurs with their firms' balance sheet data and thus obtain measures of firm total factor productivity and sales per worker. This allows us to test one of the implications of the learning ability model: firms' productivity should be increasing in firm density in the place where the entrepreneur was located at learning age (controlling for the current density). Because this dataset only includes entrepreneurs, it cannot be used to test the other implication of the learning model, i.e., that all else equal, learning opportunities should increase the odds of selecting into entrepreneurship. A second dataset we use (the SHIW sample) overcomes this problem. SHIW contains data on a representative sample of the Italian population, reporting, for each participant in the survey, type of occupation, demographics (including current place of residence and birth) and data on personal income distinguished by source - such as income from entrepreneurial activity. However, it has no detailed information on the firm these people work for or manage (besides size). Hence, the two dataset nicely complement each other. Finally, to investigate further and more directly whether one learns entrepreneurial abilities by exposure to other firms earlier in life, we supplement the ANIA survey with measures of managerial practices collected using the methodology pioneered by Bloom and Van Reenen (2010b). If exposure to a larger set of firms allows one to learn superior managerial practices, then entrepreneur who grew up in high-firm-density locations should rely on better managerial practices.

Consistent with the learning model we find that individuals who grew up in a location with a higher entrepreneurial density are indeed more likely to become entrepreneurs. This result holds independently of whether we use a broader definition of entrepreneur (one that also includes the self-employed) or a narrower one that only features individuals running an incorporated business. Our finding holds while controlling for the firm density in the current location (reflecting thick-market externalities) and also for measures of current access to external finance in the local market were the firm is located and in the location of the entrepreneur at learning age. When we look at variation in performance among

entrepreneurs, we find that those who faced a higher firms density at learning age earn a higher income from business and run a larger firm, which is consistent with the idea that entrepreneurial abilities can be acquired and that acquisition occurs through exposure to an entrepreurial environment. A one standard deviation increase in firm density at learning age results in a 24% higher income and 18% higher firms size. Because the SHIW only reports where a person was born and where he currently lives, this result is obtained under the assumption that an individual at learning age was located in the sample place where he was born, thus inducing some measurement error in the firms density at learning age.[1] The other sample is free from this problem and in addition allows to retrieve measures of firms productivity. In this sample we find that firms run by entrepreneurs who faced a higher firm density at learning age have a higher total factor productivity and higher output per worker.

Our identification relies on two sources of variation: (a) differences over time in firm density for people of different age living in the same province where they grew up (stayers); (b) cross-province differences in firm density for people of the same age who grew up in different provinces and are currently living in the same province (movers).[2]

The final question we address is what aspects of entrepreneurship are more subject to be learned. Modern literature on entrepreneurship argues that being an entrepreneur requires a variety of skills.[3] Classical theories of entrepreneurship stress the role of personal traits, in terms of the ability to innovate (Schumpeter, 1911) and to bear uncertainty and risk (Knight, 1921; Kihlstrom and Laffont, 1979). These features of entrepreneurship have probably an important genetic component and is still unclear whether they can be learned. On the other hand, managerial capabilities are more likely to be learned. We therefore test whether entrepreneurs who grew up in high firm-density provinces adopt better managerial practices and develop traits that are associated with entrepreneurship. We do find some evidence that entreprenuers grown up in high firm-density locations adopt better managerial practices, though the effect in not precisely estimated. We find no evidence that exposure to firms at learning age affects such traits as risk aversion, aversion to ambiguity, self-confidence and optimism that have been cited as belonging to entrepreneurs. These traits

[1] This measurement error is likely to be small; from the Ania dataset we calculate that 85% of people born in a given province are still in that provice at learning age.

[2] An Italian province is an administrative unit approximately equivalent to a US county.

[3] For example, Lazear (2005) shows that MBAs with a more balance set of skills (lower variance in exam grades) are more likely to become entrepreneurs.

are either learned early in life, possibly within the family (Dohmen et al., 2012), or are acquired genetically. We also find no evidence that entrepreneurial density at learning age impacts on innovation capacity, suggesting that also this key aspect of entrepreneurship is less subject to being learned.

The rest of the paper proceeds as follows. In Section 2 we relate our work to the vast literature on entrepreneurship. In Section 3 we lay down a simple model of entrepreneurial choice allowing for learning and obtain two testable predictions: higher learning opportunities shift to the right the initial distribution of entrepreneurial talent and a) increase the chance that an individual becomes an entrepreneur; b) raises the ability of those who select into entrepreneurship. We discuss also how to operationalize opportunities to learn entrepreneurial ability. In Section 4 we discuss our identification strategy and present the data in Section 5. Results are shown in Section 6, first for the SHIW and then for the ANIA sample. Section **??** shows the evidence on managerial practices and traits and Section 8 concludes.

## 2 Relation to the literature

There is a vast literature on the determinants of the choice to become an entrepreneur and of entrepreneurial success.[4] Our approach, relating entrepreneurial outcomes to the entrepreneurial density (ED henceforh) of the location where the would-be entrepreneur was living when young, adds to several current debates in entrepreneurship.

First, we contribute to the literature on the determinants of occupational choice. There is clear evidence that offsprings of entrepreneurs are more likely to be become entrepreneurs themselves than offspring of employees. Parker (2009) surveys this literature and distinguishes among five hypotheses: (i) the inheritance of the family business; (ii) relaxation of liquidity constraints (iii) learning of general entrepreneurial skills (iv) industry- or firm-specific skills, possibly including access to the business network of parents, and (v) correlated preferences between parents and their offspring, possibly enhanced by role modeling. He concludes that the evidence supplies some support for (iii), (iv), (v), consistent with the idea that entrepreneurship is at least partially transmittable and, possibly, learnable. Of course, the use of intergenerational transfer cannot distinguish between the genetic and the social component of parents-offsprings transmission of entrepreneurial attitudes. Some re-

[4]See Parker (2009) for a comprehensive survey.

cent work has addressed this issue using twin studies.[5] Lindquist, Sol, and van Praag (2012) use adoptees to test the role of nature vs. nurturing in transmitting entrepreneurship. They show that the effect of adoptive parents are twice as large as those of the biological parents. Other twin studies confirm a larger role for "nurture" relative to "nature" in determining the choice to become and entrepreneur (Nicolaou et al., 2008; Zhang et al., 2009; Nicolaou and Shane, 2010). Our work contributes to this literature by showing that not only the family, but also the local economic environment in which a person grows up contributes to the choice to become an entrepreneur. We show that growing up in a high ED area contributes to accumulate entrepreneurial skills, which increases the supply of entrepreneurs.

An alternative channel through which ED may affect the supply of entrepreneurs is role modelling: in high ED areas individuals may develop a taste for being an entrepreneur. Lindquist, Sol, and van Praag (2012) find that the intergenerational transmission is stronger from a parent to an offspring of the same sex, a fact that they interpret in terms of role modelling. Needless to say, role modelling can also be transmitted through the social environment and could explain our findings on the likelihood of becoming an entrepreneur. However, in itself it cannot explain the higher ability of entrepreneurs who grew up in denser area. If anything, role modelling should encourage relatively less able individuals to become entrepreneurs, thus lowering the average ability of entrepreneurs.

There is also a growing literature that studies the effects of networks on entrepreneurship, reviewed among others in Hoang and Antoncic (2003). Most of this work finds that local networks do help entrepreneurial activity. Michelacci and Silva (2007) attribute to the importance of local networks the fact that entrepreneurs tend to be less mobile that employees. Compared to this work, we show that the ED one is exposed to in youth remains a significant determinant of entrepreneurial success in adolthood. This holds after controlling for current ED and even among movers, for which the original network is less likely to have an independent effect today. This implies that the network effect is not confined to supplying useful inputs today (knowledge spillovers, access to credit, customers, inputs) but also contributes to improve the entrepreneurial ability. In fact, its effects survive to being severed from the network itself. This idea is confirmed by some recent work on return immigrants, who are more likely than non migrants to start a business even if they have lost access to their original social network while oversees (Wahba and Zenou, 2012).

[5]See Sacerdote (2011) for a recent survey.

We also contribute to the vast literature on local externalities (Cingano and Schivardi, 2004; Duranton and Puga, 2004b; Rosenthal and Strange, 2004b). In particular, our approach singles out one specific external effect: learning ability and traits from others. Within the entrepreneurship literature, Glaeser, Kerr, and Ponzetto (2010) document that area-sectors with lower average firm size grow more in subsequent years, mostly due to a disproportionate effect of entrants. They conclude that a higher supply of entrepreneurial talents is consistent with the evidence. We provide an explanation of the heterogeneity in entrepreneurial skills: in some areas it is easier to accumulate them. Giannetti and Simonov (2009) study the correlation between entrepreneurial density at the municipality level and the propensity to become an entrepreneur, finding a positive correlation after accounting for a large set of potentially correlated effects. Differently from us, they correlated entrepreneurial outcomes with current density, rather than density at learning age. Their strategy is therefore unable to isolate pure learning effects.

Methodologically, our approach is related to a small labor/geography literature on wage city premia. Glaeser and Maré (2001) first showed that a fraction of the urban wage premium - the extra wage that workers get when moving to a city– stays with them when they leave the city and move back to a rural area. They interpret this as evidence that workers accumulate human capital while in cities. This evidence based on US data has been confirmed and extended by De la Roca and Puga (2013) for Spain and Matano and Naticchioni (2012) for Italy. Compared to these papers, we focus on entrepreneurs and consider a specific period of life in which learning should be particularly important. Moreover, we use ED as indicator of learning opportunities, rather than densely versus sparsely populated areas.

# 3 Learning, entrepreneurial ability and occupational choice

We use the occupational choice model of Lucas (1978), as modified by Guiso and Schivardi (2011) to allow for multiple locations and an entry costs. We illustrate the model briefly to derive some empirical predictions and refer the interested reader to Guiso and Schivardi (2011) for details. The economy is comprised by $N$ locations, each with a unit population of workers, who can choose to be employee at the prevailing wage or to become entrepreneur. An entrepreneur combines capital and labor to produce output with a decreasing returns

to scale function and is the residual claimant, that is, entrepreneurial income is:

$$\pi(x) = xg(k,l) - rk - wl - c \tag{1}$$

where $x$ is entrepreneurial ability, $k$ capital, $l$ labor, $r$ the rental price of capital, $w$ the wage and $c$ a fixed entry cost. The rental price and the wage are equalized across locations. Entrepreneurial talent is drawn from a random variable $\widetilde{x}$ distributed according to a distribution function $\gamma(x, \lambda_i)$ over the support $(\underline{x}, \overline{x})$, $0 \leq \underline{x} < \overline{x} \leq \infty$, with corresponding cumulative distribution function $\Gamma(x, \lambda_i)$, $i = 1, ..., N$. The parameter $\lambda$ is a shifter of the distribution of talent. It represents the learning opportunities that characterize each location.[6] We assume that $\partial\Gamma/\partial\lambda < 0$: $\lambda$ shifts the probability distribution to the right in the first order stochastic dominance sense. Hence, individuals who grow in a high $\lambda$ region have a higher entrepreneurial talent.

As in Lucas (1978), the model implies that individuals with ability above a given threshold will become entrepreneurs, as entrepreneurial profits monotonically increase with ability. Given a threshold $z$, the probability to become and entrepreneur is prob$(x > z) = 1-\Gamma(z, \lambda)$. Because:

$$\frac{d(1 - \Gamma(z,\lambda))}{d\lambda} = -\frac{\partial\Gamma(z,\lambda)}{\partial\lambda} > 0. \tag{2}$$

equation (2) implies that it is more likely that an individual turns into entrepreneurship in regions with higher $\lambda$. This simply states that where there are more learning opportunities, and therefore entrepreneurs are on average more capable, more people will become entrepreneurs.

**Implication 1** *The probability that an individual chooses to become an entrepreneur is increasing in* $\lambda$.

The average entrepreneurial ability is the expected value of $x$ conditional on being an entrepreneur:

$$E(x|z,\lambda) = \frac{\int_z^{\overline{x}} x\gamma(x,\lambda)dx}{1 - \Gamma(z,\lambda)}. \tag{3}$$

The effect of a change in $\lambda$ on average entrepreneurial quality is:

$$\frac{dE(x|z,\lambda)}{d\lambda} = \frac{[\int_z^{\overline{x}} x\frac{\partial\gamma}{\partial\lambda}dx - E(x|z,\lambda)\frac{\partial(1-\Gamma(z,\lambda))}{\partial\lambda}]}{(1 - \Gamma(z,\lambda))} \tag{4}$$

[6]Of course, $\lambda$ might be any shifter of the distribution of talents. Distinguishing learning from other possible explanations will be the main task of the empirical analysis.

The effect of a shift in the ability distribution cannot be signed a priori, as it depends on the distribution function of ability. However, $\frac{dE(x|z,\lambda)}{d\lambda} > 0$ holds for a general family of distributions: the log-concave distributions (Barlow and Proschan, 1975).[7] This family of distributions includes, among others, the uniform, the normal and the exponential. For such distributions, a positive correlation between the share of entrepreneurs and their average quality will emerge. Guiso and Schivardi (2011) show that this is indeed the case in the data, so that we assume that this condition holds and derive our second implication.

**Implication 2** *Average entrepreneurial quality increases in* $\lambda$.

It is also immediate to show that the same conclusion holds for any monotone transformation of $x$. Given that profits are strictly increasing in $x$, from Implication 2 immediately follows:

**Implication 3** *Average entrepreneurial profits increase in* $\lambda$.

To sum up, a Lucas-type model of occupational choice implies that individuals that can more easily learn entrepreneurial abilities are more likely to opt for an entrepreneurial job and, conditional on doing so, to earn higher income and manage more productive firms.

### 3.1 Modelling learning opportunities

In order to test these implications we need an operational measure of $\lambda-$ the opportunities to learn entrepreneurial abilities. For this we assume that individuals growing in different locations also face different learning environments because locations differ in the density of entrepreneurs active at a given moment in time. Individuals who grow up in locations that are rich in firms and entrepreneurs have more opportunities to learn from the experiences of other entrepreneurs, as part of their socialization process, compared to individuals who grow up in locations lacking entrepreneurs. The idea that individuals acquire entrepreneurial capabilities from interacting and growing with other entrepreneurs is consistent with a growing literature showing that individual traits, besides being transmitted through parenting, are acquired through socialization (Bisin and Verdier, 2001), in particular through group socialization. Indeed, one strand of literature led by Hurrelmann (1988) and particularly Harris (2011), argues that interactions with peers dominate those

[7] A function $h$ is said to be log-concave if its logarithm $\ln h$ is concave, that is if $h''(x)h(x) - h'(x)^2 \leq 0$.

with parents in the process of learning and personality formation. Furthermore, because group interactions develop with age and become particularly intense as young individuals start branching off from the restraints of their parents, these theories imply that the acquisition of entrepreneurial capabilities through social learning should peak when young individuals are in their late teen ages. Empirically, we will identify this age within the bracket 15-18 (which we label the learning age) and proxy learning opportunities with the density of entrepreneurs in the area where individuals lived at their learning age.

Entrepreneurial density at learning age as a measure of learning opportunities captures the idea that it is easier to listen to/observe directly tales of entrepreneurs' success and failures and thus learn both what leads to success and how to avoid making mistakes that lead to failure. Our empirical strategy is also consistent with the plausible idea that there are stages of learning through socialization characterized by different contents about what is learned. For our purpose, the formative years – those that define what an individuals wants to be and what he can be as an adult – belong in the age bracket 12-18 (Erikson Erik, 1968). Feedback from other entrepreneurs concerning the content of their work, the requirements to succeed in doing it, the type of life one can expect from selecting an entrepreneurial job, "role modeling", etc., can be critical at this age. How important it is may depend on the number of learning points an individual is exposed to.

Even if some entrepreneurial traits can be learned, not necessarily all can in the same measure. Entrepreneurial jobs require several ingredients: a) the ability to produce ideas, which may have an innate and a learnable component; b) the capital to implement the idea, which can be inherited or can be raised in the market. If capital is raised, one needs to know how to obtain it, how to identify a potential pool of investors and how to present and sell the idea to them. This capability can be learned, possibly from other entrepreneurs; c) ability to stand risk. Twin studies show that standing risk has a large innate component but may also have a shared environmental component due to upbringing, albeit very small (Cesarini et al., 2009). People's willingness to bear risk also includes knowledge of how to manage it when risk arises, which can be learned possibly from the experiences of others. This is probably more true when decisions entail uncertainty in the sense of Knigth. Uncertainty can be dispelled through learning and thus avoid its main consequences: opting for the safe alternative (a job as an employee) when faced with an ambiguous entrepreneurial prospect; e) ability to assemble factors of production in an efficient way, which requires

organizational skills- the skill emphasized in our version of Lucas (1978) model shown in the previous section. While there could be an innate component, this is the type of skill that can most easily be acquired either through socializations or organized learning – such as participation in a MBA program; f) finally, entrepreneurial jobs require ability to put up effort, have the persistence to pursue an objective and probably have a positive or optimistic attitude. Potentially all of these ingredients can be acquired, though not necessarily to the same degree. We take no a priori stance on which features that potentially matter for entrepreneurship can be learned early in life, but offer instead some evidence of what is learned by being exposed to a "thicker" entrepreneurial environment.

# 4 Identifying learning effects

Our empirical strategy consists of showing that growing up in an area with higher entrepreneurial learning opportunities (as measured by the number of firms per capita, the variable $ED$ below) is associated with a higher likelihood of becoming an entrepreneur as well as better entrepreneurial outcomes later in life. We now discuss the main empirical challenges we face in bringing this prediction to the data.

Our empirical framework is based on regressions of the form:

$$Y_{it} = \alpha + \beta ED_{j(i,t_L)t_L} + \gamma ED_{j(i,t)t} + \varepsilon_{it} \tag{5}$$

where $Y_{it}$ is an entrepreneurial outcome for individual $i$ in year $t$ (being an entrepreneur or entrepreneurial capacity), $t_L < t$ is the year in which individual $i$ was 15-18 (the learning age), $ED_{j(i,s)\tau}$ is year $\tau$'s firm per capita in the location $j$ in which individual $i$ was living in year $s$, and $\varepsilon_{it}$ an error term.

The role of current firm density ($ED_{j(i,t)t}$) in this regression is well know from the literature on local externalities and agglomeration economies.[8] The role of firm density at learning age ($ED_{j(i,t_L)t_L}$) is instead the channel we emphasize in this paper (learning entrepreneurial skills while a teenager) and in our framework it may exist over and above that of $ED_{j(i,t)t}$. Naturally, an empirical challenge is that the effect of $ED_{j(i,t_L)t_L}$ may be hard to identify separately from that of $ED_{j(i,t)t}$ given the strong persistence in spatial agglomeration of firms. There are two distinctive features of our approach which give us

[8]For surveys of this literature, see Duranton and Puga (2004a), Rosenthal and Strange (2004a), Moretti (2011).

identifying power. First, learning externalities can be distant (in the time dimension) from the current status, which is of course especially true for older entrepreneurs. Second, some individuals currently live in locations that are different from those in which they grew up, spatially breaking the link between $ED_{j(i,t_L)t_L}$ and $ED_{j(i,t)t}$. We will hence use a sample of movers to provide more compelling identification of the effect of entrepeneurial learning opportunities on entrepreneurial outcomes.

A more complicated issue is the possibility that unobserved factors that explain an entrepreneur's success also explain a large share of firms in a given area, i.e., $ED_{j(i,t)t}$ is potentially correlated with $\varepsilon_{it}$. For example, a well functioning local financial system might be able to lower entry barriers and at the same time screen the best entrepreneurial projects. Given that $ED_{j(i,t)t}$ is strongly serially correlated, any bias induced by this particular form of endogeneity will transmit also to our effect of interest (the effect of $ED_{j(i,t_L)t_L}$ onto $Y_{it}$). We do not have instrumental variables that may explain differences in geographical agglomeration of firm and are uncorrelated with unobservable determinants of firm success. Instead, we adopt two empirical strategies to partially address this issue. The first is to have a rich set of controls (including demographics, geographical controls, and controls for both current and past credit market imperfections), which in principle minimizes the set of unobservables that may potentially be correlated with current firm density. The second is, again, using a sample of movers. If provinces had idiosyncratic dynamics in firm density, the endogeneity bias induced by correlation between $ED_{j(i,t)t}$ and $\varepsilon_{it}$ would not "transmit" to the effect of $ED_{j(i,t_L)t_L}$ onto $Y_{it}$ in a sample of movers (because $j(i,t_L) \neq j(i,t)$). However, as we document below, provinces do have a common time dynamics induced by overall economic growth. In other words, $ED$ appears to follow an AR(1) process with drift:

$$ED_{jt} = \mu_t + \rho ED_{jt-1} + \zeta_{jt} \tag{6}$$

where it is assumed that $E(\zeta_{jt}\zeta_{ks}) = 0$ for all $\{j,k\}$ and $\{s,t\}$.

For stayers ($j(i,t) = j(i,t_L)$), we are regressing

$$Y_{it} = \alpha + \beta ED_{jt_L} + \gamma ED_{jt} + \varepsilon_{it}$$

and, given (6), $ED_{jt_L}$ will naturally be correlated with $ED_{jt}$, implying that if $E(\varepsilon_{it}|ED_{jt}) \neq 0$ then also $E(\varepsilon_{it}|ED_{jt_L}) \neq 0$.

For movers, however, we will be regressing:

$$Y_{it} = \alpha + \beta ED_{kt_L} + \gamma ED_{jt} + \varepsilon_{it}$$

and $ED_{kt_L}$ and $ED_{jt}$ are correlated only because of aggregate effects (especially recent ones, as farther ones exert diminishing effect as long as $\rho < 1$). In other words, $E\left(\varepsilon_{it}|ED_{jt}, \mu_t, \mu_{t-1}, ...\right) \neq 0$ but $E\left(\varepsilon_{it}|ED_{jt_L}, \mu_t, \mu_{t-1}, ...\right) = 0$. Controlling for year effects, therefore, breaks the correlation between current firm density and firm density at learning age in the equation for movers. Since our interest centers on identification of $\beta$, this is enough to achieve identification. Using movers, however, may introduce a selection bias. For example, movers may be more risk tolerant and risk tolerance also explains selection into entrepreneurship. For this reason, we use a Heckman probit selection model where we use the spouse's place of birth as an exclusion restriction.

Notwithstanding the econometric identification problems, there are also alternative stories that could explain an effect of $ED_{j(i,t_L)t_L}$ on entrepreneurship outcomes, besides learning. Two alternative explanations are genetic and cultural effects. One might argue that some areas are populated by individuals whose genetic endowment is more conducive to entrepreneurship. Although the literature has shown that genetics matters for occupational choices at the individual level,[9] it is much less obvious that there are systematic differences across populations. Still, this might be in principle a possibility. A more likely one is cultural differences. Following Weber's theory, in certain areas entrepreneurship might be regarded as a particularly appealing occupational choice, and entrepreneurial success as a highly rewarding outcome. In such areas, individuals might be more likely to become entrepreneurs and put more effort in entrepreneurship. This story would give rise to the same type of correlation implied by the learning story and would be robust to the mobility specification. In fact, in an area where entrepreneurship is highly regarded (or where individuals have a better genetic endowment), we will observe more and better entrepreneurs. Moreover, movers from such areas will remain better entrepreneurs, as both culture and genes are portable.

To address these issues, we exploit the different frequencies at which ED on one side and culture and genes on the other evolve. In fact, we will show that ED has changed

[9]Lindquist, Sol, and van Praag (2012) survey the recent literature using twins to determine the role of genetics in determine the choice of becoming entrepreneurs. They conclude that at most 40% of the variation in entrepreneurship is explained by genes.

substantially over the sample period even after partialling out aggregate time effects , giving rise to non trivial within-location time series variation. Cultu1re, and even more so genetics, are instead processes that move at very low frequencies. We will therefore check how our results change as we increase the number of spatial controls in the regressions. With very fine local controls, in fact, we will be exploiting mostly the time series variation in ED. If we find that the effect remains stable as we increase the degree of spatial controls, we can conclude that our results are not simply driven by cross sectional differences in fixed local attributes (such as culture or genetics), but that within-location changes in ED still results in differences in the propensity to become entrepreneurs and in entrepreneurial ability.

# 5 Data

## 5.1 The SHIW sample

We use two main data sources that complement each other. The first is the Bank of Italy Survey of Households Income and Wealth (SHIW) - which collects information on demographics, income and assets on a representative sample of Italian households. The survey is run biannually and we use all the 10 waves from 1991 to 2010 for a total of 65,149 observations. For our purposes, the SHIW contains data on people's occupations and earnings from various sources - including earnings from business. Moreover, for each individual it reports the province of birth and province of residence. The province is our geographical reference for measuring learning opportunities. Provinces are relatively contained units comparable in size to a US county. There are 95 of them at the start of the sample period.[10] To identify entrepreneurs we use two measures. The first is a broad one that includes people who are self employed, partners of a company and owners that run an incorporated business (18% in total). The second is a narrow definition which only includes the latter category (8% of the sample) and is replicates the entrepreneur definition in the ANIA survey described next. This sample allows to study occupational choice but is limited in terms of the information regarding the firm; the most relevant one is the size of the firm the individual works for. Table 1, panel A shows summary statistics for the SHIW sample.

[10]Over the sample period new provinces were created by splitoff of existing provinces, but we use the initial 95 province classification.

### 5.2 The ANIA sample

Our second data source consists of detailed information on a sample of entrepreneurs and their firms. The data set is the outcome of a survey conducted by ANIA (the Italian National Association of Insurance Companies), covering 2,295 private Italian firms with between 10 and 250 employees. The survey was conducted between October 2008 and June 2009. The survey consisted of two distinct questionnaires. The first collected general information on the firm, and was filled by the firm officials on a paper form. The focus of this first questionnaire was on the type of firm-related insurance contracts that the firm had or was considering. But the questionnaire also collected general information on the firm (such as ownership structure, size and current performance) and its demographic characteristics. The second questionnaire collected information directly on the person in charge of running the firm. This turns out to be the owner in 45% of cases, the CEO in 22%, the General Director in 20%, and another figure (such as the President) in 13% of cases. The questionnaire was filled in face-to-face CAPI interviews by a professional interviewer of a specialized company. Several groups of data were collected, including information on personal traits and preferences, individual or family wealth holdings, family background, and demographics. The latter in particular includes information on place of birth and place where the individual (as well as his/her spouse) grew up. For approximately half of the firms, those incorporated as limited liabilities companies, we have also access to balance sheets. These data were provided by the CERVED Group, a business information agency operating in Italy. The data from the two sources were matched using a uniquely identifying ID number. This is the sample that we use in this paper. The data necessary to compute TFP are available for the years 2005-2007. We end up with 966 firms and almost 2,600 firm-year observations. TFP is computed using factor shares, assuming constant returns to scale (results are robust to alternative computation methods). Differently from the SHIW sample, we know the municipality in which the business is located. As our preferred geographical unit we use the *local labor systems* (LLS), i.e., territorial groupings of municipalities characterized by a certain degree of working-day commuting by the resident population, which should represent self-contained labor markets. LLS are similar the the US MSA. We use the definition based on the 2001 Census, which identifies 686 LLS. Results are robust when performing the analysis at the provincial level.

Summary statistics for this sample are shown in Table 1, Panel B. The comparison with

the SHIW sample indicates that they are fairly similar. The main differences is that the ANIA entrepreneurs are on average more educated, are less likely to have grown up or be resident in the South, and manage larger firms, due to the fact that the ANIA sampling scheme excludes firms with less than 10 employees and only include limited liability firms. The appendix describes the survey design of the Shiw and Ania surveys in greater detail and provides a precise description of the variables used in this study.

### 5.3 Measuring learning opportunities and other controls

We measure learning opportunities with firm density at "learning age". As a measure of location, we use provinces for the SHIW sample and LLS for the ANIA sample.[11] To measure firm density we obtain census data on the number of firms[12] active in each location and year since 1951 and divide it by the corresponding resident population. We then attach to each individual in our sample (either in the SHIW or the ANIA survey) the firm density in the location at learning age. The latter is taken to be age 18. Given that Census data are available for 1951, 1961, 1971, 1981, 1991, 1996 and 2001, we attach to each learning age the closest available census data (this is done through simple linear interpolation for the mid-census years). Given that the data from the most recent census (2011) are not yet available, the number of current firms is taken from the Istat datasets on production units by LLS and province, available for 2009.

In the ANIA sample we know where each entrepreneur was living at age 18 and can attach ED in the the location where she was at learning age. In the SHIW we know where the individual was born but not where she grew up; for them we assume that they grew up in the province of birth. This implies that in this sample our measure of learning opportunities contains some measurement error.

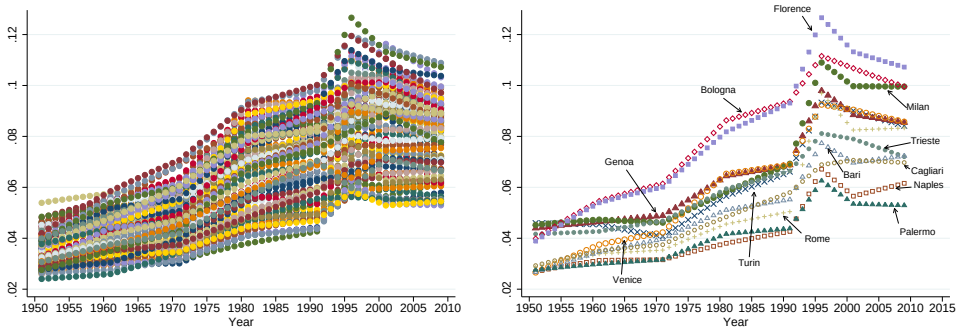
Our identification exploits both cross-sectional and time-series variation in firm density at learning age: (a) individuals who grew up and currently live in a given province were exposed to a different firm-density environment at learning age if born in different years (stayers); (b) individuals of the same age and currently living in a given province were

[11] This is due to data restrictions, as the province is the SHIW's lowest available level of geographical disaggregation.

[12] In the choice of the firm definition we are constrained by data availability in the early censuses. In particular, they only report data for production units, similar to a plant. Moreover, they do not distinguish between business units and other types, such as government units. We therefore keep all units throughout. In the most recent censuses, non-business units account for less than 3% the of observations.

exposed to a different firm-density environment at learning age if they grew up in different provinces (movers). Figure 1, panel A shows the pattern of the density over time for each province in the sample, while Panel B zooms on the largest Italian provinces. Density differs considerably both across provinces at each point in time as well as over time within provinces with very different time profiles. Consider individuals living in a province A, differing along two dimensions: their current age and the province where they grew up. Some grew up in the same province where they currently live, while others moved after spending their formative years in a different province. We can identify the effect of learning opportunities through two thought experiments: everything else equal, we can compare the occupational decision and the performance as entrepreneurs of individuals currently located in province A who grew up in A in different times and hence faced different firm densities (i.e., individuals who grew up in Florence in the early 1950s vs. late 1990s). Or we can compare the outcomes of individuals of the same age who grew up in different provinces, and hence faced different firm densities at learning age, before both moving to a given province A (i.e., individuals who grew up in the late 1990s in Florence vs. Palermo). Because firm density is persistent, current density and density at learning age for individuals based in the province where they grew up tend to be relatively highly correlated (correlation coefficient 0.6), especially for younger individuals. Identification is facilitated by movers. For this subsample of individuals (18% in the SHIW and 25% in the ANIA sample) correlation between current density and density at learning age is much smaller (0.2).

Figure 1: The evolution of firm density across Italian provinces, 1951-2009




(a) All provinces (b) Largest provinces

Source: Istat Census data

Finally, we complement our datasets with information on local credit market develop-

ment using a measure of number of bank branches per capita in each location-year.

# 6 Results

The two datasets we use have both pros and cons. The SHIW data are a representative sample of Italian households, and as such are ideal to study the decision to become an entrepreneur. The ANIA data instead only sample entrepreneurs. On the other hand, the SHIW only reports the current place of residence and the residence at birth, while ANIA also contains the location when 18. Moreover, the ANIA data are relative to firms, and allow to construct the direct empirical counterpart of the Lucas model's measure of entrepreneurial ability, i.e., TFP. We begin the analysis with the SHIW sample, where we study occupational choice and entrepreneur's performance, measured by business income. We then move on to the ANIA data to dig deeper into the determinants of entrepreneurial performance.

## 6.1 SHIW sample: occupational choice and performance

We start by estimating a probit model for the binary decision to become an entrepreneur in the SHIW data. In our specification, besides including firm density in the province where the individual was located at learning age (here the province of birth), $ED_{j(i,t_L)t_L}$, we control for firm density in the province of current residence, $ED_{j(i,t)t}$. A large literature (see e.g., Evans and Jovanovic, 1989; Banerjee and Newman, 1994) argues that liquidity constraints and easiness in raising external capital foster entrepreneurship. Because of this, firm density at learning age may reflect local financial development as more firms may be started where capital is easier to raise. We account for this by controlling for the number of bank branches per capita in the province at learning age and for the same variable in the province of residence at the time the survey was run. More generally, we capture general geographical features that may affect occupational decisions (such as the cost of starting a business) by inserting dummies for the area of birth (north-east, north-west, center, south, islands) and for the area of residence of the individual. In addition we control for individual demographics such as gender, age, education attainment, work experience and family characteristics (whether married, number of earners, and family size). All regressions contain (but are not reported) dummies for education, year, and sector.

Results are shown in Table 2. The first four columns report results for the broad

definition of entrepreneurship and the other four for the narrow definition. Marginal effects with robust standard errors are reported throughout. People who grew up in provinces with a higher firm density are more likely to choose to become an entrepreneur either using the broad definition or the narrow definition. This is true even controlling for the current density in the place where the individual is located, which is not surprisingly positively correlated with people's decision to be an entrepreneur. Increasing density at learning age by one standard deviation increases the probability that an individual decides to become an entrepreneur by 1.5 percentage points using the broad definition of entrepreneurship (8.5% of the sample mean) and by 0.6 percentage points using the narrow definition (7% of the sample mean).

One implication of the learning ability model is that learning occurs locally and takes place mostly when people grow up. This suggests a simple placebo test: firm density other than in the province at learning age should play no role if added to the regression and only density in the province where the individual was at learning age should matter. Accordingly, we construct a placebo by assigning to each individual in the sample the density in a randomly drawn province-year and add this to the specification. Results in column 3 are consistent with this implication; the placebo has no explanatory power while the effect of the density at learning is, economically and statistically, unaffected (although the placebo is surprisingly significant when using the narrower definition of entrepreneur).

Finally, in columns 4 and 8 we focus on a sample of movers (individuals who were born in a place different than their current place of residence). To control for selection into moving, we use the spouse's place of birth as an exclusion restriction. These exclusion restrictions are statistically powerful (F-statistics of 94). We find that the basic outline of results is unchanged and the evidence pointing to a downward bias when endogeneity issues are ignored.

We next move on to entrepreneurs' success, measured by income from business. Since this is available only for entrepreneurs, we estimate regressions using a Heckman selection model to correct for selection into entrepreneurship and use as an exclusion restriction the number of family earners, which we assume affects the decision to become an entrepreneur (if other family earners offer some risk diversification) but not entrepreneurial success. Otherwise the set of controls is the same as in the probit estimates in Table 2. Results are shown in Table 3 for the broad definition of entrepreneur (first four columns) as well as

the narrow one (last four columns). In both cases $ED$ at learning age has a positive and strongly significant effect on the (log of) entrepreneur's earnings. The effect is somewhat smaller but retains fully its statistical significance even after controlling for the current firms density in the province (columns 2 and 5). And the effect is unchanged when the placebo is added to the regressions, without the latter playing a statistically signicant role (columns 3 and 6). Finally, focusing on a sample of movers where identification is arguably more credible (columns 4 and 8), leaves the qualitative pattern of results unchanged while reducing precision as expected.[13] Using the results in columns 3 and 6 as baseline, we find that increasing firm density at learning age by one standard deviation increases the income currently earned by an entrepreneur by 22% among entrepreneurs broadly defined and by 11% among the narrowly defined entrepreneurs.

### 6.2 ANIA sample: entrepreneurial performance

We now turn to the ANIA sample to investigate more thoroughly the determinants of entrepreneurial quality. Following Lucas (1978), we measure entrepreneurial quality with TFP. Moreover, we measure ED in the location in which the entrepreneur was living at 18, rather than at birth. This is indeed important, as the two locations differ for 20% of cases in our sample.

In all regressions we include the same set of controls as in the previous regressions: financial development today and at learning age, male dummy, age, years since in control of the firm (since we do not have labor market experience), marital status dummy, family size, education dummies, area of learning and of residence dummies, sector dummies). Relative to Tables 2 and 3, we also add a dummy for whether parents were entrepreneur (which is missing in the SHIW data set). We cluster standar error at the firm level, as we use three observations per firm. Table 4 shows the results. Firm density at learning age has a positive (4.4) and precisely estimated effect on the firm TFP (column 1). Increasing ED at learning age by one standard deviation (0.02) increases TFP by 8%. None of the other controls display a significant effect. In column (2) we use current ED as the regressor, finding a positive and significant effect, similar in magnitude to the effect of density at learning. This is consistent with a large literature on external effects (Rosenthal and Strange, 2004a; Moretti, 2011). Given that density at learning and current density are likely to be correlated,

[13] In columns 4 and 8 we control for joint selection into entrepreneurship as well as moving.

in Column (3) we insert both variables. We find that the coefficient of ED at learning age is only marginally smaller and retains its statistical significance at 5%, while current ED remains positive but loses statistical significance. Thus, in a horse race, ED at learning age beats current ED, suggesting that learning externalities of the sort we are emphasizing could be more important than those on which the literature has focused so far.

We perform a series of robustness checks. First, in column (4) we control for ED at birth. It might in fact be that learning occurs earlier in life than what we hypothesize. The estimated coefficient of ED at birth is not statistically different from zero, supporting the assumption that learning occurs later in one's life, while that of ED at learning age remains unchanged. One additional concern might be that, given that we use up to 3 year of data for the same firm (2005-2007), our standard errors might be incorrect. Although this concern is addressed by the fact that we cluster standard error at the firm level, in Column (5) we report the results when using only observations for 2006 (results are similar if we use 2005 or 2007). Even if the number of observations is reduced to one third and even using robust standard errors, the estimates and the standard errors are virtually unchanged.

In the last three columns, we dig deeper into what dimension of data variability identifies the parameter of ED at learning age. In fact, ED at learning age varies both cross-sectionally, as different LLS are characterized by different degrees of entrepreneurship, and in the time-series, as over the sample period the number of firms have increased substantially. In Column (6) we introduce year of learning dummies (8 dummies corresponding to the 8 census years we use to construct ED at learning age). In this specification, we are controlling for any aggregate trend in the number of firms. For example, these might be correlated with cohort effects, if younger cohorts have better entrepreneurial skills (although we do always control for the age of the entrepreneur). In fact, with these dummies we only use the cross sectional variation to identify the parameters. The estimated coefficient increases slightly and remains statistically significant.

In the last two columns we increase the number of spatial controls, introducing 20 region dummies (column 7) and 95 province dummies (column 8), both for location at learning age and current location. In this specifications, we are using mostly the time series variation to identify the parameters, accounting for potentially persistent effects correlated with DP at learning age and TFP, such as genetics or culture, discussed in Section 4. Again, we find that the point estimates are unchanged and that the coefficient is statistically significant at

10%. This shows that both the time series and the cross sectional variation contribute to identifying the effect of ED at learning age, and that the two dimensions of data variability lead to the same results.[14]

Although we have used a large set of controls, one might still be concerned about unobserved heterogeneity correlated both with ED and with TFP. For example, some locations might have some special features, such as natural resources, proximities to urban centers etc., that make starting a business particularly attractive, and also increase productivity. Such unobserved characteristic might determine both ED at learning, ED today, and TFP. However, this is only true for individuals that did not move between the learning age and today. For movers, there is no reason to expect that ED at learning age is correlated with unobserved characteristics of the current location.[15] We therefore perform a series of regressions using only movers. Results are even stronger than in the whole sample. In column (1) of Table 5 we run our basic specification, finding a coefficient of 7.6, significant at 5%. In Column (2) we run a placebo test, including ED in the current location when the entrepreneur was 18. Given that this is not the location of residence at 18, it should not influence TFP: and this is what we find.

One potential criticism is that the sample of movers is a selected one. To address this issue, we employ a Heckman correction model, using two exclusion restrictions. First, we create a dummy equal to one if the entrepreneur's spouse was born in a different LLS than the one the she was located at 18. Second, we create another dummy for entrepreneurs who were resident in a different location at 18 than the birth location (this dummy cannot be constructed in the SHIW sample because we only observe the place of birth and the current place of residence). The idea is that these two dummies are correlated with mobility but not with entrepreneurial ability. The dummies are highly significant and of the expected sign in the selection equation. The Mills ratio is significant in the second stage equation. The effect of ED at learning age becomes even stronger and more precisely estimated.

As a final check, we have used sales per worker as an additional measure of entrepreneurial

[14] We have also experimented with dummies at the LLS level, obtaining estimates similar in magnitude but with larger standard errors. This is not surprising, given the large number of dummies (more than 400) and the limited sample size.

[15] The only reason for which ED at learning age might be correlated with unobserved characteristics of the current location is that growing up in a location with a high ED might be conducive to moving to a location in which firms are particularly productive. Although we cannot rule out this possibility, we see it as unlikely. In addition, even if it were present, it might be seen as a form of learning: growing up in a high ED location makes an entrepreneur better at choosing the area in which to locate her firm.

quality. While TFP is the more correct empirical counterpart of the Lucas model, estimating TFP requires more assumptions than just computing a simple measure of labor productivity. Results in Table 6 indicate that, if anything, the effect is even stronger with this performance measure. ED at learning age always carries a positive and significant coefficient while the effect of current ED is much smaller and insignificant. Increasing density at learning age by one standard deviation results in an increase in output per worker between 12% and 15%, depending on the specification.

Overall, we take this evidence as supportive of the idea that one important channel through which entrepreneurial abilities are acquired is by individuals early exposure to an entrepreneurial environment.

# 7 What features of entrepreneurship are learnable?

Being an entrepreneur requires multiple talents. The entrepreneur develops new ideas, evaluate their market appeal, organizes production, bears the risk of failure.[16] Sorensen and Chang (2008) propose three features that define an entrepreneur: risk bearing, coordination and innovation. These three aspects are well rooted in the economics tradition. The role of the entrepreneur as the bearer of risk dates back to Knight (1921), who ascribes the very existence of the firm to its role as an insurance provider. He stated that "the system under which the confident and venturesome assume the risk and insure the doubtful and timid by guaranteeing to the latter a specified income in return for an assignment of the actual results...is the enterprise and wage system of industry. Its existence in the world is the direct result of the fact of uncertainty" (p.269-70). The importance of organizing production, and of localized spillovers to learn the "masteries of trade", was pointed out by Marshall (1890), while Schumpeter (1911) emphasized the role of the entrepreneur as the carrier of innovation.

In this section we offer empirical evidence on how "learnable" these three features are, using unique information from the ANIA survey. The ANIA survey contains a rich set of questions to investigate preference traits, in terms of risk and ambiguity aversion, confidence, optimism and job satisfaction. The original survey lacks information on coordination capacity. In fall 2012 we re-contacted the entrepreneurs in the Ania sample and asked them to

[16] Lazear (2005) argues that an entrepreneur is the "Jack-of-all trade", i.e., an individual with a balanced set of skills, rather than one that excels in a particular activity. Using data on Stanford GSB MBAs, he finds that those that tend to perform uniformly well in all courses are indeed more likely to become entrepreneurs.

participate in a second round of survey to assess the managerial practices. We implemented the methodology developed by the World Management Survey (see Bloom and Van Reenen (2010b)). Of the original 966 entrepreneurs, we were able to re-interview 388. We refer the interested reader to appendix section A.1 for details of the data collection method. From this second survey we obtain a score that goes from 1 (low quality) to 5 (high quality) on three different domains of managerial practices: reliance on monitoring, whether the firm sets clear targets, and whether it has in place strategies to manage human resources. We also construct a general index of managerial practices as the average of the three. Finally, the innovation capacity is measured by two (arguably imperfect) measures. The first is the share of 2007 sales of innovative or significantly improved products or services that were introduced on the market between 2005-2007. The second is a score of the practices used by the firm to manage the innovation process, collected in the managerial practices follow up survey. Descriptive statistics for all these variables are in Table 7.

As a first check, in Appendix Table A.2 we regress TFP on traits. We have no prior on how the degree of risk aversion or of optimism should correlate with firm level TFP. Indeed, the correlation is always insignificant. Next, we check if these traits are correlated with ED at learning age. That is, we ask if an individual who grew up in a high ED area developed a higher capacity to bear risk. The results are reported in Table 8. We first report a regression without individual controls and then the same regression, controlling for individual characteristics. In general, we find no evidence that entrepreneurial traits are influenced by ED at learning age. The only significant coefficient is on ambiguity aversion, that is lower if the individual grew up in a denser area when not controlling for individual characteristics, but becomes small and very imprecisely estimated with individual controls. Overall, these results are more consistent with an innate theory of traits.

The ability to manage is more likely to be learnable. Indeed what one learns in business schools and in colleges specialized in teaching entrepreneurship, is precisely managerial skills. Babson College - one of the first to specialize in entrepreneurship - introduces itself by saying it "was the first to understand that thinking and acting entrepreneurially is more than just an inclination. Rather, it can be taught. And we do it better than anyone." But these skills may also be learned even before college by direct observation and exposure to adopted practices by other firms one hears about in the place one is growing up.

We test this potential channel using measures of managerial practices discussed above.

To validate these measures, in Table A.3 we report the results of regressions in which productivity and firm size (measured by the log of the number of employees) is regressed on the managerial practices scores. As shown by Bloom and Van Reenen (2007) and Bloom, Sadun, and Van Reenen (2012), managerial practices are strongly correlated with the size of the firm and its productivity. This is true in our sample too: each type of managerial practice as well as the general index is positively and significantly correlated with TFP and firm size. Table 9 runs regression of these measures on ED at learning age controlling for current density. Interesting, if we only control for current density, density at learning age has a positive and statistically significant correlation with managerial practices while current density has small and insignificant effect (column 1,3 5 and 7). The effect of density at learning age retains its positive effect but its size halves and the estimate looses precision when adding all the other controls.

Finally, we run the same exercise for innovation capacity. Appendix Table A.2 (column 6) and A.3 (column 5) show that the two measures of innovation are not correlated with TFP. Consistently, we find no effect of ED at learning age on innovation capacity (Table 10): the schumpeterian component of entrepreneurship is not related to ED at learning age. This might also be due to the general low innovation content of the Italian productive system, specialized in productions with a medium-low technological content (Pagano and Schivardi, 2003).

Overall, we take this evidence as indicating that managerial capabilities can be learned from other entrepreneurs, while both traits and innovation capacity might be more an innate component, less subject to the influence of the environment.

# 8 Conclusions

This paper has analyzed the extent to which to grow up in a high entrepreneurial area increases both the likelihood that an individual becomes an entrepreneur and her entrepreneurial ability. We found that this is indeed the case, and that the effects of entrepreneurial density at learning age are stronger than those of current entrepreneurial density. Results hold in two distinct datasets and are robust to a large set of controls. Moreover, we find suggestive evidence that individuals growing up in high ED areas acquire managerial skills, while neither individual traits in terms of risk aversion, optimism etc. nor innovative capacity are affected. This suggests that the latter components of entrepreneur-

ship have a larger innate component, that swamps any effect of the environment.

Our results have important policy implications. The lack of entrepreneurship is one of the key barrier to growth in underdeveloped areas. Indeed, these areas might be trapped in a no entrepreneurship equilibrium, where the scarcity of "data point" implies that potential entrepreneurs find it hard to acquire the required skills. The typical solution of this problem has been to inactivate firm entry locally, with mixed results. Our evidence on movers suggest an alternative policy. Once entrepreneurial skills are acquired, they are actually transferable with the individual. This means that would-be entrepreneurs from underdeveloped areas could transfer to a high density areas at learning age, acquire entrepreneurial skills, and return to the area of origin to start a business. Indeed, there is some evidence consistent with this mechanism in the development literature (Wahba and Zenou, 2012). Designing programs that promote young would-be entrepreneurs' mobility from underdeveloped areas to high ED areas and back to start a business might be more effective than promote directly local entrepreneurship.

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Table 1: Descriptive statistics

| Variable | Mean | Std. Dev. | Variable | Mean | Std. Dev. |
|---|---|---|---|---|---|
| **Panel A: SHIW Sample** | | | | | |
| Entrepreneur, Def. I | 0.18 | 0.38 | Mover | 0.21 | 0.41 |
| Entrepreneur, Def. III | 0.080 | 0.27 | Mover— Entrepreneur | 0.18 | 0.39 |
| ED growing up | 0.06 | 0.02 | Born NorthW | 0.19 | 0.39 |
| ED today | 0.087 | 0.016 | Born NorthE | 0.20 | 0.40 |
| Male | 0.611 | 0.48 | Born Center | 0.20 | 0.40 |
| Age | 42.28 | 9.73 | Born South | 0.39 | 0.48 |
| Experience | 22.05 | 11.19 | Resident NorthW | 0.24 | 0.43 |
| Elementary school | 0.11 | 0.3200 | Resident NorthE | 0.22 | 0.41 |
| Junior HS | 0.32 | 0.46 | Resident Center | 0.21 | 0.41 |
| HS degree | 0.40 | 0.49 | Resident South | 0.31 | 0.46 |
| College | 0.13 | 0.34 | Agriculture | 0.04 | 0.20 |
| Post graduate | 0.01 | 0.07 | Manufacturing | 0.23 | 0.42 |
| Married | 0.71 | 0.45 | Construction | 0.06 | 0.25 |
| Family size | 3.40 | 1.18 | Services and others | 0.64 | 0.47 |
| N. of family earners | 20.82 | 0.86 | Firm size | 4.31 | 37.14 |
| Income (Log) | 9.02 | 0.86 | | | |
| **Panel B: ANIA Sample** | | | | | |
| TFP (log) | 2.45 | .90 | Learn in South | .21 | .41 |
| ED learn | .06 | .02 | Resident in NorthW | .31 | .46 |
| ED today | .08 | .01 | Resident in NorthE | .29 | .45 |
| Male | .67 | .46 | Resident in Center | .19 | .3 |
| Age | 47.02 | 10.48 | Resident in South | .19 | .39 |
| Years in control | 15.79 | 10.99 | Mining | .02 | .16 |
| Elementary school | .00 | .07 | Manufactuing | .35 | .47 |
| Junior HS | .06 | .24 | Utilities | .01 | .09 |
| HS degree | .67 | .46 | Construction | .07 | .26 |
| College | .23 | .42 | Trade | .24 | .42 |
| Post graduate | .01 | .13 | Transport | .04 | .20 |
| Married | .78 | .41 | Other services | .24 | .42 |
| Family size | 3.06 | 1.17 | Employees | 34.33 | 40.38 |
| Mover | .25 | .43 | Spouse same area | .53 | .49 |
| Learn in NorthW | .30 | .46 | Moved before learning | .19 | .39 |
| Learn in NNorthE | .28 | .45 | LC learn | -8.37 | .44 |
| Learn in Center | .19 | .39 | LC Today | -7.42 | .31 |

**Note:** See appendix A.2 for the definition of the variables.

Table 2: The probability of becoming an entrepreneur, SHIW sample

| | Definition I | | | | Definition II | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ED learn | 1.233*** | 0.834*** | 0.839*** | 1.529** | 0.530*** | 0.296** | 0.301** | 1.879** |
| | (0.182) | (0.199) | (0.199) | (0.725) | (0.122) | (0.133) | (0.133) | (0.804) |
| ED today | | 0.973*** | 0.973*** | 1.074** | | 0.564*** | 0.564*** | 0.400 |
| | | (0.198) | (0.198) | (0.537) | | (0.130) | (0.130) | (0.522) |
| ED placebo | | | 0.100 | 0.170 | | | 0.088** | 0.196 |
| | | | (0.067) | (0.192) | | | (0.044) | (0.190) |
| LC growing up | 0.001 | 0.001 | 0.001 | -0.005 | -0.009** | -0.009** | -0.006** | -0.036*** |
| | (0.005) | (0.005) | (0.005) | (0.013) | (0.004) | (0.004) | (0.003) | (0.014) |
| LC today | (0.001) | -0.019* | -0.019* | -0.072*** | 0.015** | 0.005 | 0.005 | -0.029 |
| | (0.009) | (0.010) | (0.010) | (0.027) | (0.006) | (0.007) | (0.007) | (0.027) |
| Male | 0.050*** | 0.050*** | 0.050*** | 0.066*** | 0.012*** | 0.012*** | 0.012*** | 0.023** |
| | (0.003) | (0.003) | (0.003) | (0.010) | (0.002) | (0.002) | (0.002) | (0.010) |
| Age | 0.001** | 0.001* | 0.001* | -0.000 | 0.001*** | 0.001** | 0.001** | 0.001 |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) | (0.001) |
| Experience | 0.002*** | 0.002*** | 0.002*** | 0.003*** | 0.001*** | 0.001** | 0.001** | 0.002* |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) | (0.001) |
| Married | 0.022*** | 0.021*** | 0.021*** | 0.017 | 0.026*** | 0.026*** | 0.026*** | 0.041*** |
| | (0.004) | (0.004) | (0.004) | (0.012) | (0.002) | (0.002) | (0.002) | (0.012) |
| Family size | -0.002 | -0.002 | -0.002 | -0.009* | 0.026*** | 0.026*** | -0.002 | -0.009** |
| | (0.002) | (0.002) | (0.002) | (0.005) | (0.001) | (0.001) | (0.001) | (0.005) |
| # fam. earn. | 0.013*** | 0.012*** | 0.012*** | 0.028*** | 0.020*** | 0.020*** | 0.020*** | 0.048*** |
| | (0.002) | (0.002) | (0.002) | (0.006) | (0.001) | (0.001) | (0.001) | (0.010) |
| Obs. | 65149 | 65149 | 65149 | 13917 | 65149 | 65149 | 65149 | 13917 |

**Note:** All regressions include year, education, macro-area of learning and of current location and sector dummies. Columns (4) and (8) use only a sample of movers. Entrepreneur definition I includes: (a) Individual entrepreneurs, (b) Self-employed/Craft workers, (c) Owner or member of family business, and (d) working shareholder/partner. Definition II excludes category (b).

Table 3: Entrepreneurial income, SHIW sample

| | Definition I | | | | Definition II | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ED learning | 16.115*** | 12.005*** | 12.054*** | 5.037* | 9.002*** | 5.977*** | 6.023*** | 10.519** |
| | (3.246) | (3.127) | (3.135) | (2.666) | (1.965) | (2.103) | (2.104) | (4.726) |
| ED today | | 11.237*** | 11.246*** | 3.210 | | 7.528*** | 7.529*** | 3.953 |
| | | (3.283) | (3.286) | (2.451) | | (2.165) | (2.165) | (3.414) |
| ED placebo | | | 0.970 | -0.452 | | | 0.799 | 0.317 |
| | | | (0.899) | (0.851) | | | (0.702) | (1.326) |
| LC learning | -0.200*** | -0.134* | -0.136* | -0.151*** | -0.172*** | -0.131** | -0.133** | -0.277*** |
| | (0.067) | (0.071) | (0.071) | (0.057) | (0.057) | (0.058) | (0.058) | (0.102) |
| LC today | 0.087 | (0.119) | (0.118) | -0.005 | 0.193** | 0.070 | 0.071 | 0.320** |
| | (0.113) | (0.133) | (0.133) | (0.099) | (0.096) | (0.101) | (0.101) | (0.133) |
| Male | 0.836*** | 0.863*** | 0.863*** | 0.481*** | 0.443*** | 0.448*** | 0.448*** | 0.325*** |
| | (0.095) | (0.104) | (0.104) | (0.043) | (0.034) | (0.034) | (0.034) | (0.062) |
| Age | 0.021*** | 0.019*** | 0.019*** | 0.015*** | 0.022*** | 0.020*** | 0.020*** | 0.028*** |
| | (0.006) | (0.006) | (0.006) | (0.004) | (0.004) | (0.004) | (0.004) | (0.006) |
| Experience | 0.016*** | 0.015*** | 0.016*** | -0.003*** | 0.003 | 0.002 | 0.002 | 0.002 |
| | (0.005) | (0.006) | (0.006) | (0.004) | (0.003) | (0.003) | (0.003) | (0.005) |
| Married | 0.318*** | 0.327*** | 0.327*** | 0.197*** | 0.246*** | 0.251*** | 0.250*** | 0.175* |
| | (0.056) | (0.059) | (0.059) | (0.054) | (0.044) | (0.045) | (0.045) | (0.094) |
| Family size | 0.019 | 0.021 | 0.022 | 0.015 | 0.040*** | 0.042*** | 0.042*** | 0.089*** |
| | (0.017) | (0.018) | (0.019) | (0.016) | (0.015) | (0.016) | (0.016) | (0.025) |
| Mills ratio(s) | | | | | | | | |
| p-value | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |
| Observations | 11719 | 11719 | 11719 | 2223 | 5223 | 5223 | 5223 | 1039 |

**Note:** All regressions include year, education, macro-area of learning and of current location and sector dummies. Entrepreneur definition I includes: (a) Individual entrepreneurs, (b) Self-employed/Craft workers, (c) Owner or member of family business, and (d) working shareholder/partner. Definition II excludes category (b).

Table 4: TFP and ED at learning age, ANIA sample

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| ED learn | 4.415*** | | 3.610** | 4.076** | 4.216** | 5.148** | 3.453* | 3.999* |
| | (1.656) | | (1.741) | (1.819) | (1.862) | (2.386) | (1.911) | (2.097) |
| ED today | | 5.055** | 3.824 | 3.849 | 4.594* | 3.607 | 2.469 | 4.827 |
| | | (2.235) | (2.351) | (2.388) | (2.733) | (2.427) | (2.981) | (4.722) |
| LC learn | -0.038 | 0.007 | -0.012 | -0.008 | -0.063 | 0.049 | -0.088 | 0.053 |
| | (0.103) | (0.103) | (0.103) | (0.103) | (0.113) | (0.112) | (0.135) | (0.211) |
| LC today | -0.220 | -0.289 | -0.342* | -0.344* | -0.311 | -0.429** | -0.411 | -1.201 |
| | (0.180) | (0.189) | (0.191) | (0.194) | (0.216) | (0.203) | (0.256) | (0.804) |
| Male | -0.074 | -0.073 | -0.071 | -0.069 | -0.034 | -0.068 | -0.059 | -0.035 |
| | (0.049) | (0.049) | (0.049) | (0.050) | (0.056) | (0.049) | (0.050) | (0.054) |
| Age | 0.278 | 0.072 | 0.246 | 0.210 | 0.116 | -0.080 | 0.082 | 0.152 |
| | (0.185) | (0.170) | (0.188) | (0.201) | (0.214) | (0.450) | (0.230) | (0.304) |
| Years since | 0.001 | 0.001 | 0.002 | 0.002 | 0.003 | 0.002 | 0.001 | 0.002 |
| control | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.002) | (0.003) |
| Parent entr. | -0.074 | -0.070 | -0.076 | -0.080 | -0.068 | -0.077 | -0.075 | -0.083 |
| | (0.050) | (0.050) | (0.050) | (0.050) | (0.054) | (0.051) | (0.051) | (0.054) |
| Married | 0.092 | 0.103 | 0.096 | 0.103 | 0.104 | 0.094 | 0.078 | 0.086 |
| | (0.070) | (0.070) | (0.070) | (0.071) | (0.075) | (0.071) | (0.071) | (0.076) |
| Fam. size | -0.002 | -0.004 | -0.003 | -0.007 | 0.001 | -0.011 | -0.005 | -0.005 |
| | (0.023) | (0.023) | (0.023) | (0.023) | (0.025) | (0.024) | (0.023) | (0.024) |
| ED birth | | | | -2.376 | -1.891 | -2.238 | -3.331 | -3.944 |
| | | | | (2.920) | (3.176) | (3.032) | (3.137) | (3.379) |
| Observations | 2,586 | 2,586 | 2,586 | 2,547 | 843 | 2,547 | 2,547 | 2,547 |

**Note:** All regressions are based on the data for the years 2005-2007, with the exception of column (5), that uses only data for 2006. Standard errors clustered at the level of the firm in all columns but (5), that uses robust standard errors. All regressions include year, education, macro-area of learning and of current location and sector dummies. Column (6) also includes year of learning dummies. Column (7) uses geographical dummies at the regional level and column (8) at the provincial level, both for area of learning and of current location. Significance levels: *: 10%, ** : 5%, *** : 1%

Table 5: TFP and ED at learning age, ANIA sample, Movers only

| | (1) OLS | (2) OLS | (3) Heckman | (4) First stage | (5) Heckman | (6) First stage |
|---|---|---|---|---|---|---|
| ED learn | 7.597** | 6.664** | 9.560*** | 1.928 | 8.542*** | 1.943 |
| | (3.139) | (3.266) | (3.142) | (3.997) | (3.283) | (4.004) |
| Ed today | 4.082 | 2.470 | 3.617 | -2.371 | 1.850 | -2.395 |
| | (4.203) | (4.412) | (4.300) | (5.256) | (4.438) | (5.251) |
| LC learn | 0.185 | 0.192 | 0.233 | 0.148 | 0.242 | 0.149 |
| | (0.174) | (0.174) | (0.173) | (0.222) | (0.172) | (0.222) |
| LC today | -0.359 | -0.449 | -0.235 | 0.541 | -0.343 | 0.540 |
| | (0.334) | (0.349) | (0.347) | (0.400) | (0.364) | (0.400) |
| Male | -0.045 | -0.049 | -0.044 | 0.104 | -0.049 | 0.104 |
| | (0.102) | (0.101) | (0.104) | (0.109) | (0.103) | (0.109) |
| Age | 0.658* | 0.880** | 0.993*** | 0.839** | 1.241*** | 0.841** |
| | (0.343) | (0.384) | (0.367) | (0.398) | (0.397) | (0.398) |
| Years since | -0.001 | -0.001 | -0.002 | -0.004 | -0.003 | -0.004 |
| control | (0.004) | (0.004) | (0.005) | (0.005) | (0.005) | (0.005) |
| Parent entr. | 0.138 | 0.138 | 0.118 | -0.177* | 0.118 | -0.176* |
| | (0.098) | (0.098) | (0.100) | (0.104) | (0.100) | (0.104) |
| Married | 0.093 | 0.098 | 0.053 | 0.040 | 0.059 | 0.041 |
| | (0.132) | (0.131) | (0.134) | (0.145) | (0.132) | (0.145) |
| Fam. size | -0.008 | -0.010 | -0.002 | 0.029 | -0.004 | 0.029 |
| | (0.044) | (0.044) | (0.045) | (0.047) | (0.045) | (0.047) |
| ED placebo | | 4.427 | | | 4.894 | |
| | | (4.393) | | | (4.227) | |
| Spouse close | | | | -0.563*** | | -0.565*** |
| | | | | (0.118) | | (0.118) |
| Moved before | | | | 0.711*** | | 0.709*** |
| learning age | | | | (0.117) | | (0.117) |
| Mills Ratio | | | 0.340*** | | 0.336*** | |
| | | | (0.109) | | (0.108) | |
| Obs. | 671 | 671 | 2,547 | 2,547 | 2,547 | 2,547 |

**Note:** All regressions are based on the data for the years 2005-2007 for the subsample of moovers. Standard errors clustered at the level of the firm. All regressions include year, education, macro-area of learning and of current location and sector dummies. Significance levels: *: 10%, ** : 5%, *** : 1%

Table 6: Sales per worker and ED at learning age, ANIA sample

| | (1) OLS | (2) OLS | (3) OLS | (4) OLS | (5) OLS | (6) Heckman | (7) Heckman |
|---|---|---|---|---|---|---|---|
| ED learn | 7.588*** | 6.371** | 6.115** | 10.646** | 8.891* | 10.838** | 9.109** |
| | (2.507) | (2.630) | (2.688) | (4.275) | (4.530) | (4.312) | (4.570) |
| ED today | 1.960 | 1.691 | 2.435 | 0.867 | -1.921 | 0.919 | -1.888 |
| | (3.301) | (3.375) | (3.598) | (6.037) | (6.345) | (5.909) | (6.227) |
| LC learn | -0.224 | -0.224 | -0.250 | -0.020 | -0.010 | 0.002 | 0.014 |
| | (0.143) | (0.144) | (0.153) | (0.234) | (0.237) | (0.229) | (0.232) |
| LC Today | 0.192 | 0.177 | 0.327 | -0.122 | -0.257 | -0.062 | -0.209 |
| | (0.269) | (0.275) | (0.294) | (0.462) | (0.471) | (0.469) | (0.484) |
| Male | 0.104 | 0.097 | 0.153** | 0.246* | 0.244* | 0.229 | 0.227 |
| | (0.069) | (0.070) | (0.076) | (0.142) | (0.142) | (0.140) | (0.139) |
| Age | 0.030 | 0.108 | 0.023 | 0.491 | 0.869 | 0.587 | 0.974* |
| | (0.271) | (0.291) | (0.304) | (0.510) | (0.556) | (0.533) | (0.579) |
| Years since | 0.005 | 0.005 | 0.007* | 0.003 | 0.003 | 0.002 | 0.002 |
| control | (0.003) | (0.003) | (0.004) | (0.007) | (0.007) | (0.007) | (0.007) |
| Parent entr. | -0.063 | -0.061 | -0.077 | 0.188 | 0.190 | 0.181 | 0.182 |
| | (0.070) | (0.070) | (0.075) | (0.132) | (0.131) | (0.134) | (0.133) |
| Married | 0.112 | 0.108 | 0.100 | 0.336** | 0.344** | 0.330** | 0.339** |
| | (0.091) | (0.091) | (0.099) | (0.158) | (0.159) | (0.160) | (0.161) |
| Fam. size | -0.004 | -0.001 | -0.004 | -0.034 | -0.035 | -0.033 | -0.036 |
| | (0.032) | (0.032) | (0.035) | (0.054) | (0.054) | (0.054) | (0.054) |
| ED birth | | 5.371 | 5.876 | | | | |
| | | (4.050) | (4.292) | | | | |
| ED placebo | | | | | 7.497 | | 7.537 |
| | | | | | (5.888) | | (5.855) |
| Mills ratio | | | | | | 0.100 | 0.095 |
| | | | | | | (0.221) | (0.221) |
| Obs. | 2,679 | 2,637 | 880 | 697 | 697 | 2,637 | 2,637 |

**Note:** All regressions are based on the data for the years 2005-2007, with the exception of column (3), that uses only data for 2006. Standard errors clustered at the level of the firm in all columns but (3), that uses robust standard errors. Columns 4-7 only use movers. All regressions include year, education, macro-area of learning and of current location and sector dummies. The exclusion restrictions for the two-stage Heckman procedure are the same as in Table 5 (first stage not reported for brevity). Significance levels: *: 10%, ** : 5%, *** : 1%

Table 7: Descriptive statistics, traits, managerial practices and innovation

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | **Panel A: Traits** | | | | |
| Risk | 966 | 2.70 | .67 | 1 | 4 |
| Ambiguity | 954 | 3.40 | 1.44 | 1 | 5 |
| Confidence | 944 | 2.18 | .40 | 1 | 3 |
| Optimism | 946 | 7.33 | 1.76 | 0 | 10 |
| Satisfaction | 935 | 7.47 | 1.67 | 0 | 10 |
| | **Panel B: Managerial practices** | | | | |
| Management | 388 | 2.41 | .66 | 1 | 4.41 |
| Monitoring | 388 | 2.67 | .82 | 1 | 5 |
| Targets | 388 | 2.41 | .90 | 1 | 5 |
| People | 388 | 2.33 | .64 | 1 | 5 |
| | **Panel C: Innovation** | | | | |
| Share innov. | 736 | 17.43 | 24.46 | 0 | 100 |
| Innov. practices | 388 | 2.09 | 1.2 | 1 | 5 |

**Note:** See appendix A.2 for the definition of the variables.

Table 8: Entrepreneurial traits and ED at learning age, ANIA sample

| | (1) riskaverse | (2) riskaverse | (3) ambiguityav | (4) ambiguityav | (5) confidence | (6) confidence | (7) optimism | (8) optimism | (9) satisfaction | (10) satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| ED learn | -1.776 | 1.196 | -5.644** | -0.184 | -0.558 | 0.658 | 1.708 | -3.672 | 1.517 | 0.482 |
| | (1.240) | (1.799) | (2.650) | (3.974) | (0.710) | (0.932) | (3.583) | (5.351) | (3.326) | (4.550) |
| ED today | 1.490 | -1.203 | -1.495 | 2.089 | -1.366 | -0.556 | -3.230 | -6.811 | -2.040 | -1.545 |
| | (1.926) | (2.226) | (4.102) | (4.896) | (1.158) | (1.354) | (4.705) | (5.674) | (4.720) | (5.586) |
| LC learn | | -0.075 | | -0.170 | | -0.041 | | -0.197 | | 0.133 |
| | | (0.100) | | (0.225) | | (0.061) | | (0.238) | | (0.240) |
| LC today | | 0.094 | | -0.768** | | -0.107 | | 0.514 | | -0.345 |
| | | (0.176) | | (0.380) | | (0.103) | | (0.411) | | (0.425) |
| Male | | -0.059 | | 0.133 | | 0.113*** | | -0.035 | | -0.077 |
| | | (0.048) | | (0.108) | | (0.028) | | (0.127) | | (0.113) |
| Age | | 0.185 | | -0.054 | | 0.091 | | -0.664 | | 0.019 |
| | | (0.192) | | (0.396) | | (0.105) | | (0.465) | | (0.439) |
| Years since | | 0.002 | | 0.003 | | -0.002 | | 0.012* | | 0.010* |
| control | | (0.003) | | (0.005) | | (0.001) | | (0.006) | | (0.006) |
| Parent entr. | | -0.025 | | -0.037 | | 0.044 | | -0.050 | | 0.024 |
| | | (0.048) | | (0.103) | | (0.029) | | (0.124) | | (0.117) |
| Married | | 0.030 | | 0.104 | | 0.012 | | -0.125 | | 0.016 |
| | | (0.060) | | (0.135) | | (0.038) | | (0.166) | | (0.149) |
| Fam. size | | 0.025 | | -0.004 | | -0.001 | | 0.123** | | 0.063 |
| | | (0.021) | | (0.045) | | (0.012) | | (0.052) | | (0.049) |
| Observations | 966 | 924 | 954 | 912 | 944 | 902 | 946 | 909 | 935 | 900 |

**Note:** All regressions include year, education, macro-area of learning and of current location and sector dummies. Significance levels: *: 10%, ** : 5%, *** : 1%

Table 9: Managerial practices and ED at learning age, ANIA sample

| | (1) management | (2) management | (3) monitoring | (4) monitoring | (5) targets | (6) targets | (7) people | (8) people |
|---|---|---|---|---|---|---|---|---|
| ED learn | 4.309** | 1.537 | 6.007** | 2.168 | 5.136** | 3.508 | 3.080* | 0.887 |
| | (1.784) | (2.543) | (2.365) | (3.328) | (2.445) | (3.588) | (1.801) | (2.542) |
| ED today | 0.880 | 0.930 | 0.747 | 0.730 | -1.422 | -0.831 | 2.104 | 1.710 |
| | (3.019) | (3.580) | (3.804) | (4.655) | (3.966) | (4.837) | (3.051) | (3.490) |
| LC learn | | 0.207* | | 0.154 | | 0.220 | | 0.229** |
| | | (0.114) | | (0.153) | | (0.165) | | (0.112) |
| LC today | | 0.138 | | 0.217 | | 0.040 | | 0.128 |
| | | (0.224) | | (0.297) | | (0.322) | | (0.216) |
| Male | | 0.266*** | | 0.315*** | | 0.297*** | | 0.184** |
| | | (0.075) | | (0.097) | | (0.103) | | (0.075) |
| Age | | -0.020 | | -0.143 | | 0.155 | | -0.028 |
| | | (0.222) | | (0.282) | | (0.316) | | (0.219) |
| Years since | | -0.009*** | | -0.011** | | -0.013*** | | -0.004 |
| control | | (0.003) | | (0.004) | | (0.005) | | (0.003) |
| Parent entr. | | -0.123* | | -0.110 | | -0.105 | | -0.181*** |
| | | (0.070) | | (0.093) | | (0.096) | | (0.068) |
| Married | | 0.098 | | 0.061 | | 0.103 | | 0.178** |
| | | (0.084) | | (0.121) | | (0.124) | | (0.081) |
| Fam. size | | 0.065** | | 0.075* | | 0.050 | | 0.060** |
| | | (0.032) | | (0.042) | | (0.044) | | (0.030) |
| Observations | 388 | 370 | 388 | 370 | 388 | 370 | 388 | 370 |

**Note:** All regressions include macro-area of learning and of current location and sector dummies. ). Significance levels: *: 10%, ** : 5%, *** : 1%

Table 10: Innovation and ED at learning age, ANIA sample

| | (1) Innov. Share | (2) Innov. Share | (3) Innov. practices | (4) Innov. practices |
|---|---|---|---|---|
| ED learn | 3.116 | -6.297 | 2.486 | -3.378 |
| | (3.488) | (5.084) | (3.779) | (5.484) |
| ED today | -2.958 | 3.481 | 3.338 | 4.365 |
| | (5.386) | (6.406) | (5.658) | (7.008) |
| LC learn | | 0.368 | | 0.250 |
| | | (0.261) | | (0.208) |
| LC today | | -0.303 | | 0.207 |
| | | (0.498) | | (0.428) |
| Male | | 0.109 | | 0.420*** |
| | | (0.133) | | (0.142) |
| Age | | -0.468 | | -0.103 |
| | | (0.506) | | (0.445) |
| Years since | | -0.014** | | -0.012** |
| control | | (0.006) | | (0.006) |
| Parent entr. | | -0.049 | | 0.050 |
| | | (0.129) | | (0.134) |
| Married | | -0.008 | | -0.213 |
| | | (0.162) | | (0.182) |
| Fam. size | | 0.085 | | 0.104* |
| | | (0.058) | | (0.061) |
| Observations | 736 | 707 | 388 | 370 |

**Note:** The dependent variable in first two columns is the log of 1 plus the share of 2007 sales of innovative or significantly improved product or services that were introduced on the market between 2005-2007. In column (3) and (4) the dependent variable is a score of the management of innovation within the firm (see appendix for details). All regressions include macro-area of learning and of current location and sector dummies. Significance levels: *: 10%, ** : 5%, *** : 1%

# A Appendix: Information on Data (To be completed)

### The ANIA survey

The ANIA Survey for Small Business Companies collects data on a sample of 2,295 Italian firms and their top manager. The survey was conducted on a sample of small Italian firms, having up to a maximum of 250 employees, extracted from the total number of companies registered with CERVED - a business information agency operating in Italy which collects companies balance sheet data. The survey was conducted between October 2008 and July 2009.

Compared to the initial target set at the completion of 2,300 interviews, the investigation closed with 2,295 completed interviews. Participation in the survey entails the willingness to provide information on the use of insurance markets and details regarding the firm as well as the willingness of the top CEO/owner of the company to take part in a face to face interview with a professional interviewer. The first type of data was collected through a questionnaire filled out by each company, while the second type was obtained through an interview using the Computer Assisted Personal Interviewing) method. Partly because the survey took place during the financial crisis and partly because interviews targeted the CEO of the firm, the drop out rate was relatively high particularly among firms in the larger size categories lengthening. To account for this the survey design was slightly reviewed to include a larger number of smaller firms (with less than 20 employees) which were easier targets. This has caused the sample to be somewhat biased towards smaller firms than the population of businesses with up to 250 employees.

In the final sample of 2,295 firms, 98.5% are private, located in 59% of cases in north Italy, 19% in central Italy and 22% in the south and islands. In 85% of cases these are controlled by an individual within a family and a remaining 10% by a group of people without family ties.

## A.1 The managerial practices survey

The data collection is based on a telephone double-blind survey technique and comprises a set of open ended questions that are subsequently evaluated using a scoring grid(Bloom and Van Reenen, 2010a; Bloom et al., 2012). Qualitative answers of SPs are then recoded into quantitative measures with a score ranging between 1 (worst) to 5 (best managerial practices). We have first set up a group of interviewers, trained them with a specific program and have then them run the survey. A comparison of the observable characteristics of the contacted group and those who participated shows no systematic differences in terms of firm characteristics, sector, area of location and of learning. Some small but statistically significant differences emerges in terms of entrepreneurs' characteristics (see Appedix Table A.1.

## A.2 Variables definitions

Here we provide a detailed description of the variables used in the paper whose definition is not obvious.

*Age of entrepreneur*: in years.

*Cost of work effort*: obtained from the following question to the entrepreneur "When you work, after how many hours do you start feeling like stopping and do something else?".

*Education*: Number of years of schooling of the entrepreneur.

*Firm age*: Years since firm foundation

*First born*: Indicator equal to 1 if entrepreneur is the first born child.

*Male*: Indicator equal to 1 if entrepreneur is a male.

*Optimism*: answers to the question borrowed from a standard Life Orientation Test (Scheier et al., 1994) " How much do you agree with the statement: overall I expect more good things than bad things to happen to me". Answers are on a 0 to 10 scale, and are increasing in optimism.

*Risk tolerance*: Indicator obtained using the answers to the question "If the investment strategy of the firm depends only on you, among the following alternative strategies which one would you pick up? One that yields a) Low profits but no risk of losses; b) Decent profits and rare losses; c) Good profits with some chances of incurring losses; d) Very high profits with a high risk of significant losses. The indicator is coded between 1 and 4, increasing in risk tolerance.

*Return on assets and return on sales*: Four measures of accounting profits are used: Gross operating margin; Gross profit before interest; Gross profits after interest; Net profits after interest. Each of these measures is scaled with the book value of total assets to obtain a measure of ROA and with firm sales to obtain a measure of ROS

*Total assets*: Book value of firm total assets.

*Years in control*: Number of years since the entrepreneur has acquired the responsibility of the management of the firm.

Table A.1: Comparison between re-interviewed and non re-interviewed entrepreneurs

| | Re-interviewed | | | Non re-interviewed | | | |
|---|---|---|---|---|---|---|---|
| | N. Obs. | Mean | Std. Dev. | N. Obs. | Mean | Std. Dev. | Difference |
| TFP | 388 | 2.50 | .83 | 578 | 2.41 | .94 | .088 |
| Sales per worker | 388 | 4.93 | 1.06 | 574 | 4.86 | 1.24 | .069 |
| Employees | 388 | 36.61 | 40.14 | 578 | 32.79 | 40.50 | 3.819 |
| dmsect1 | 388 | .03 | .18 | 578 | .02 | .15 | .011 |
| dmsect2 | 388 | .38 | .48 | 578 | .33 | .47 | .046 |
| dmsect3 | 388 | .01 | .10 | 578 | .00 | .09 | .001 |
| dmsect4 | 388 | .04 | .21 | 578 | .09 | .29 | -.052*** |
| dmsect5 | 388 | .23 | .42 | 578 | .24 | .43 | -.005 |
| dmsect6 | 388 | .03 | .18 | 578 | .04 | .21 | -.014 |
| dmsect7 | 388 | .25 | .43 | 578 | .23 | .42 | .012 |
| dmarea1 | 388 | .30 | .461 | 578 | .31 | .46 | -.008 |
| dmarea2 | 388 | .30 | .45 | 578 | .29 | .45 | .003 |
| dmarea3 | 388 | .20 | .40 | 578 | .19 | .39 | .016 |
| dmarea4 | 388 | .18 | .38 | 578 | .19 | .39 | -.012 |
| dmarealearn1 | 388 | .29 | .45 | 578 | .31 | .46 | -.021 |
| dmarealearn2 | 388 | .29 | .45 | 578 | .28 | .45 | .004 |
| dmarealearn3 | 388 | .21 | .41 | 578 | .17 | .38 | .041 |
| dmarealearn4 | 388 | .20 | .40 | 578 | .22 | .41 | -.023 |
| educ | 388 | 14.06 | 2.55 | 578 | 13.37 | 2.54 | .684*** |
| age entr | 388 | 51.69 | 11.12 | 578 | 50.40 | 10.12 | 1.289* |
| Male | 388 | .71 | .45 | 578 | .66 | .47 | .052* |
| father entr | 388 | .45 | .49 | 578 | .36 | .48 | .092*** |
| years since control | 388 | 20.54 | 11.31 | 578 | 19.01 | 10.85 | 1.52** |

**Note:** the table reports means and standard deviations of key variables for the sample of entrepreneurs that were re-interviewed and that were not. The last column report differences in mean. *** indicates significantly different at 1%, ** at 5%, * at 10%.

Table A.2: Entrepreneurial traits and TFP

| | | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| riskaverse | -0.029 | | | | | |
| | (0.045) | | | | | |
| ambiguityav | | 0.013 | | | | |
| | | (0.021) | | | | |
| confidence | | | 0.078 | | | |
| | | | (0.078) | | | |
| optimism | | | | 0.011 | | |
| | | | | (0.017) | | |
| satisfaction | | | | | 0.016 | |
| | | | | | (0.018) | |
| Share innov. | | | | | | -0.034 |
| | | | | | | (0.022) |
| ED learn | 3.515* | 3.330* | 3.575* | 3.603* | 3.255 | 4.762* |
| | (1.965) | (1.981) | (1.980) | (1.969) | (2.095) | (2.472) |
| ED today | 0.133 | 0.074 | 0.247 | -0.548 | -0.191 | 0.199 |
| | (3.130) | (3.135) | (3.208) | (3.179) | (3.202) | (3.611) |
| LC learn | 0.070 | 0.071 | 0.072 | 0.045 | 0.055 | 0.183 |
| | (0.124) | (0.125) | (0.126) | (0.127) | (0.126) | (0.140) |
| LC today | -0.342 | -0.317 | -0.341 | -0.310 | -0.321 | -0.550** |
| | (0.244) | (0.244) | (0.246) | (0.252) | (0.252) | (0.272) |
| Male | -0.096 | -0.105 | -0.103 | -0.096 | -0.101 | -0.070 |
| | (0.065) | (0.066) | (0.066) | (0.066) | (0.067) | (0.075) |
| Age | 0.272 | 0.287 | 0.256 | 0.263 | 0.225 | 0.401 |
| | (0.229) | (0.231) | (0.233) | (0.233) | (0.242) | (0.272) |
| Years since | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 |
| control | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Parent entr. | -0.099 | -0.095 | -0.101 | -0.107* | -0.114* | -0.073 |
| | (0.063) | (0.063) | (0.063) | (0.063) | (0.064) | (0.072) |
| Married | 0.076 | 0.078 | 0.064 | 0.068 | 0.054 | 0.055 |
| | (0.084) | (0.085) | (0.086) | (0.086) | (0.087) | (0.103) |
| Fam. size | 0.022 | 0.022 | 0.027 | 0.024 | 0.023 | 0.025 |
| | (0.027) | (0.028) | (0.028) | (0.027) | (0.028) | (0.033) |
| Observations | 924 | 912 | 902 | 909 | 900 | 707 |

**Note:** All regressions include year, education, macro-area of learning and of current location and sector dummies. ). Significance levels: *: 10%, ** : 5%, *** : 1%

Table A.3: Managerial practices, TFP and firm size

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | TFP | | | | | Employment (log) | | | | |
| management | 0.177** | | | | | 0.596*** | | | | |
| | (0.070) | | | | | (0.075) | | | | |
| monitoring | | 0.120** | | | | | 0.477*** | | | |
| | | (0.057) | | | | | (0.057) | | | |
| targets | | | 0.087* | | | | | 0.346*** | | |
| | | | (0.051) | | | | | (0.054) | | |
| people | | | | 0.221*** | | | | | 0.523*** | |
| | | | | (0.076) | | | | | (0.081) | |
| Innovation | | | | | -0.005 | | | | | 0.082* |
| | | | | | (0.036) | | | | | (0.046) |
| ED learn | 5.846* | 5.859* | 5.814* | 5.922* | 6.102** | 2.663 | 2.545 | 2.366 | 3.114 | 3.857 |
| | (3.032) | (3.020) | (3.027) | (3.011) | (3.028) | (3.795) | (3.627) | (4.032) | (3.840) | (4.100) |
| ED today | -3.307 | -3.230 | -3.070 | -3.520 | -3.122 | -5.358 | -5.152 | -4.516 | -5.699 | -5.163 |
| | (4.531) | (4.517) | (4.567) | (4.528) | (4.615) | (4.728) | (4.655) | (4.997) | (4.773) | (5.267) |
| LC learn | -0.036 | -0.017 | -0.018 | -0.050 | 0.002 | 0.316* | 0.366** | 0.364** | 0.320* | 0.419** |
| | (0.142) | (0.141) | (0.142) | (0.139) | (0.139) | (0.161) | (0.161) | (0.166) | (0.167) | (0.179) |
| LC today | -0.052 | -0.054 | -0.031 | -0.056 | -0.027 | 0.028 | 0.007 | 0.097 | 0.043 | 0.093 |
| | (0.310) | (0.312) | (0.306) | (0.310) | (0.306) | (0.328) | (0.326) | (0.335) | (0.336) | (0.351) |
| Male | -0.202** | -0.193** | -0.181* | -0.196** | -0.153 | 0.020 | 0.028 | 0.076 | 0.082 | 0.144 |
| | (0.097) | (0.094) | (0.096) | (0.096) | (0.096) | (0.113) | (0.110) | (0.115) | (0.115) | (0.120) |
| Age | 0.800*** | 0.813*** | 0.783*** | 0.802*** | 0.796*** | 0.578* | 0.635** | 0.513 | 0.581* | 0.575* |
| | (0.266) | (0.266) | (0.268) | (0.263) | (0.266) | (0.319) | (0.321) | (0.332) | (0.328) | (0.338) |
| Years since | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.007* | 0.007* | 0.007 | 0.004 | 0.003 |
| control | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.005) | (0.005) | (0.005) |
| Parent entr. | -0.173* | -0.181* | -0.185* | -0.154 | -0.194** | 0.087 | 0.066 | 0.050 | 0.108 | 0.009 |
| | (0.095) | (0.096) | (0.095) | (0.095) | (0.096) | (0.102) | (0.103) | (0.104) | (0.105) | (0.109) |
| Married | -0.039 | -0.029 | -0.030 | -0.061 | -0.022 | -0.054 | -0.025 | -0.031 | -0.089 | 0.022 |
| | (0.137) | (0.138) | (0.136) | (0.136) | (0.134) | (0.129) | (0.129) | (0.128) | (0.132) | (0.138) |
| Fam. size | 0.037 | 0.039 | 0.044 | 0.035 | 0.049 | -0.015 | -0.012 | 0.007 | -0.008 | 0.015 |
| | (0.042) | (0.042) | (0.043) | (0.043) | (0.041) | (0.044) | (0.043) | (0.045) | (0.045) | (0.046) |
| Observations | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 |

**Note:** All regressions include year, education, macro-area of learning and of current location and sector dummies. ). Significance levels: *: 10%, ** : 5%, *** : 1%