Entrepreneur Preferences and Firm Investment[*]

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(Preliminary version, please do not cite)

Abstract

This paper documents the role of entrepreneur risk and time preferences for firm performance. We use responses to questions intended to elicit risk taking and patience, which have been included in the *Rilevazione su Imprese e Lavoro (RIL)* conducted by INAPP in 2015 on a representative sample of Italian firms. We find that impatience has a negative association with both physical and human capital investment, while the propensity to undertake risk is relevant only for workplace formal learning.

JEL Classification: D01, D03, M10

Keywords: Entrepreneurship; Investment; Time Preferences

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[*] The views expressed in this paper are those of the authors and do not necessarily correspond to those of the Institution they are affiliated.

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1. Introduction

There is a widespread agreement that when it comes to the performance of small and medium enterprises (SMEs) the personality characteristics of entrepreneurs are of utmost importance (see, for reviews, Parker, 2009 and Sørensen and Chang, 2006). In this paper, we document the role of businessmen's (self-declared) risk and time preferences for choices made under uncertainty that affect the present as well as the future. We focus on physical and human capital investment; that is, activities where patience and risk taking are crucial, as they involve probabilities of yield and loss and entail weighting future benefits against present costs (Andersen et al., 2008).

On these issues, previous empirical evidence is scant. As for risk attitude, the studies referring to its impact on firm performance have proven to be quite inconclusive (see, for instance, Guiso et al., 2016). Even worse, the importance of entrepreneur time preference for the productivity of their firms has been quite neglected. This might be a serious shortcoming as recent cross-country evidence (Falk et al, 2015) shows that patience is strongly correlated with the degree of economic development, as measured at the macro level. Also, psychological traits traditionally associated with successful entrepreneurs – such as, the need for achievement (Mc Clelland, 1961), the level of the individual internal locus of control (Schiller and Crewson, 1997 and van Praag and van Ophen, 1995), the conscientiousness (Ciavarella et al, 2004), and the tenacity (Braum and Locke, 2004) – might all have something to do with the degree of time preference.[1]

No need to say, previous empirical analyses have been limited by the paucity of data available. To carry out our investigation we have included two questions in the *Rilevazione su Imprese e Lavoro* (RIL) conducted by National Institute for the Analysis of Public Policies (INAPP) in the year 2015 on a representative sample of Italian firms. In the RIL the respondent is the entrepreneur, defined as the owner of the SME who actually run it employing other people. Our entrepreneurs therefore are not simply self-employed, which the empirical literature sometimes keep together with entrepreneurs because of data limitation (van Praag, and Versloot, 2007; Cucculelli and Ermini, 2013). By using survey respondents, we focus on individuals that self-selected into entrepreneurship: preferences of businesspersons might be different from those of the population at large, but not necessarily as the choice of run a business reflects many circumstances, such as the perpetuation of a family enterprise, the availability of finance or the possibility to learn entrepreneurship from neighbors. Both risk and time preferences are elicited through a series of related quantitative questions, i.e. binary choices between, respectively, a fixed lottery and varying sure payments, and immediate and delayed financial rewards. To the best of our knowledge, these questions are quite common for household surveys but are relatively unexplored in firm surveys. A nice feature of our data is that they are collected for a relatively large number of firms. We are able to collect over 3,500 responses for risk and time preferences. A limitation is that our survey refers to Italy, a country where the degree of innovative activities carried out by the firms is quite low and the sector specialization is tilted towards traditional

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[1] Dohmen et al., (2010) highlights the joint importance of risk and time preferences for cognitive ability. Cognition refers also to a number of abilities that enable goal-oriented behavior (such as problem-solving, decision-making, sequencing etc.), which naturally lead to successful entrepreneurs.

productions. This aspect might imply that the association we found between preferences and investment is a sort of lower bound of the link that can be found in place where investment activities are featured by an higher degree of innovativeness (and therefore higher risk and possibly returns distributed on longer horizons).

Our results suggest that impatience has a negative association with both physical and human capital investment. We also find that the propensity to undertake risk impacts on the latter type of investment. The paper is structured as follows. Next section discusses the RIL questions referring to preferences. Section 3 documents the results and discusses the robustness analysis. Section 4 tackle the issue of unobserved omitted variables. The final section concludes.

2. Data

The empirical analysis is based on information obtained by the *Rilevazione su Imprese e Lavoro* (RIL) conducted by the National Institute for the Analysis of Public Policies on a representative sample of 29,000 partnerships and limited liability firms operating in the non-agricultural private sector.[2]

The RIL gathers a unique set of information about employment composition, personnel organization, industrial relations and other firms' characteristics. In particular, we have introduced in the 2015 wave two questions regarding the entrepreneur psychological attitudes in term of time preferences and risk attitudes. The wording used reflects the standard in which preferences are elicited within surveys (see, for instance, Falk et al. 2016).

Impatience. *Suppose you were given the choice between a payment (say €x, equal to your current annual income) today and a higher payment (€x + a given percentage, as clarified below) in 12 months. We will now present to you six situations. The payment today is the same in every situation. The payment in 12 months is different in every situation. For each of these situations we would like to know which one you would choose. Please assume there is no inflation, i.e., future prices are the same as today's prices. Would you rather receive €x today or €x + the following premia in 12 months: 1) 1%; 2) 5%; 3) 10%; 4) 50%; 5) 100%; 6) 300%; 7) none of the previous.*

Risk taking. *Please imagine the following situation. You have a lottery ticket that gives you a 50 percent chance of receiving an amount equal to your current annual income and the same 50 percent of receiving nothing. Would you give away your lottery ticket in exchange of a percentage of your current annual income? What percentage it will be: 1) 5%; 2) 10%; 3) 25%; 4) 50%; 5) 80%; 6) none of the previous.*

As for sample selection, we consider only firms for which the respondent is an entrepreneur, defined as the owner of a firm who actually run it employing other people. Therefore, we discard firms run by external managers (the separation between ownership and control may significantly influence the psychology of those in charge). In addition, we keep firms with at least 5 employees. By doing so, we seek to exclude self-employment and retain firms characterized by a minimum level of organizational structure.

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[2] The RIL Survey sample is stratified by size, sector, geographic area and the legal form of firms. For more details on sample design and other methodological issues related to RIL can be found at: http://www.inapp.org/it/ril.

After excluding also firms with missing information for the key variables, the final sample used for empirical analysis counts more than 3500 firms.

2.1 Descriptive statistics

The responses to the questions about time preferences and risk behavior are reported in Tables 1 and 2. The distribution across categories of responses seems similar to that provided by the studies focusing on households (see, for instance, Vischer et al. 2013),therefore suggesting that entrepreneurs are not a very different from the rest of the population.

Table 1: Responses to the RIL question on Impatience

	Freq	Percent	Cum
0.01	482	13.51	13.51
0.05	420	11.79	25.30
0.1	521	14.61	39.90
0.5	596	16.72	56.62
1	305	8.55	65.18
3	330	9.27	74.44
None of the above	911	25.56	100.00
Total	3,564	100.00	

Source: RIL 2015. Note: sampling weighted applied.

Table 2: Responses to the RIL question on Risk taking

	Freq	Percent	Cum
.05	517	14.49	14.49
.1	273	7.65	22.14
.25	377	10.56	32.70
.5	761	21.35	54.05
.8	591	16.58	70.63
None of the above	1,047	29.37	100.00
Total	3,564	100.00	

Source: RIL 2015. Note: sampling weighted applied.

To better understand the economic environment in which our analysis is carried out, Table A1 in Appendix shows the weighted descriptive statistics for the main control variables used.

As for the characteristics of the entrepreneurs and corporate governance, we find that only 24% of the firms are run by individuals with tertiary education, 57% of them are run by individuals with upper secondary education and the remaining 20.2% by who has lower secondary or primary education. Such educational profiles is coherent with the predominance of small (with less than 10 employees) and family ownership, which amount to 78% and 93%, respectively, whose management typically requires less formal education than large and market-owned companies (Croce et al. 2017). As well, we find a very small proportion of firms managed by young cohorts (10%) comparatively to the group managed by older ones (32%). Indeed this specific demographic profile of the Italian entrepreneurs is expected to be strongly correlated with patterns of time preference and risk behavior depicted in Tables 1 and 2.

Concerning the workforce composition, note that the share of employees with a tertiary education degree is 11% while the shares with upper secondary or lower secondary education are 47% and 42%, respectively. The low education attainment of the workforce reflects the weaker demand for qualified workers in Italy, as already highlighted in previous studies (Naticchioni et al. 2010). Furthermore, 14% of the workers are employed under fixed term contracts, 37% is the share of female while 31% is the proportion of the cohorts aged less than 35 years.

Our dataset also provides information also on a set of firm characteristics such as investment in innovations, economic performance and production specialization. The majority of the firms are not involved in innovation strategies: only 36% and 30% of them have undertaken product or process innovation, respectively, in the three years preceding the survey. Finally, more than 64% of them are located in the Northern region

Table 3. Other descriptive statistics for the RIL sample

	N of Obs	Mean	Std Dev
outcome variables			
ln (physical capital per employee +1)	3,398	3.78	4.50
ln (training costs per employee +1)	3,030	2.10	2.60
ln (sales per employee)	3,089	11.46	1.20
entrepreuners characteristics			
tertiary education	3,563	0.24	0.43
upper secondary education	3,563	0.57	0.49
lowe secondary or elementary education	3,563	0.19	0.39
age >59	3,563	0.32	0.47
age >39 & age<60	3,563	0.58	0.49
age<40	3,563	0.10	0.30
family ownership (0/1)	3,550	0.93	0.25
employment characteristics			
share of tertiary education	3,564	0.11	0.20
share of upper secondary education	3,564	0.47	0.30
share of young (less than 35 years)	3,564	0.31	0.26
share of female	3,564	0.37	0.30
share of fixed term contracts	3,564	0.14	0.23
gross job turnover	3,564	0.08	0.14
firms' charateristics			
foreign market (0/1)	3,564	0.18	0.39
product innovation (0/1)	3,564	0.34	0.47
process innovation (0/1)	3,564	0.30	0.46
age (in years)	3,564	22.92	14.55
4<n of employees<10	3,564	0.78	0.41
9<n of employees<100	3,564	0.19	0.39
99<n of employees<250	3,564	0.02	0.15
n of employees>249	3,564	0.00	0.05
North Ovest	3,564	0.36	0.48
North East	3,564	0.28	0.45
Centre	3,564	0.18	0.39
South	3,564	0.18	0.39

Source: RIL data. Sampling weights applied

3. The association between preferences and investment

To investigate the relationship between entrepreneurs preferences and firm's investment, we perform a simple OLS regression model on the following equation:

[1] $\qquad Y_{i,s,l} = a0 + a1\ Impatience_i + a2\ Risk\ taking_i + a3\ X_i + FE_s + FE_l + \varepsilon_{i,s,l}$

where i indexes firms, s denotes sector and l the Italian regions. We focus on two dependent variables: the (log of) physical investment per employee and the (log of) cost of training per employee. Investing in physical and human capital involves probabilities of yield and loss and entails weighting future benefits against present costs. We also check the relationship between preferences and current productivity, as proxied by the (log of) sales per employee. In Table 3 preferences are measured by using the ordinal scale derived from the EES questions (see, however, the robustness below). To limit unobserved firm heterogeneity we include area fixed effects, at the level of Italy's NUTS1 regions, and sector fixed effects, at the 2 ATECO digit. Our identification is essentially based on selection on observables. We add an increasing number of controls and show that the coefficient of interest remains relatively stable. In Section 4, we use the changes in the estimates reflecting the introduction of additional covariates to assess (together with changes in R2) the possible unobserved selection, following the suggestions from Oster (2016).

Our results for a sample of over 3,000 firms are summarized in Table 4.[3] For each outcome, we present 4 specifications. In the first one (Columns 1, 5, and 9), we do not include any additional covariate. In the second specification (Columns 2, 6, and 10) we add a number of basic controls: beyond the fixed effects for the sector of activity and those referring to NUTS1 regions, we also include the firm size, the age of the firm and its legal status. The third experiment (Columns 3, 7, and 11), adds a number for observables for the entrepreneur: namely, sex, age, and education. We also include an indicator dummy referring to the family nature of the firm. The fourth specification (Columns 4, 8, and 12) further adds indicators for having introduced some types of process or product innovations, an indicator for exporting firms as well as a set of explanatory variables for workforce composition. These controls might be useful to capture additional firm hidden heterogeneity; at the same time, they can pick up part of the impact of preferences on our outcomes.

[Table 4 here]

Our findings show a consistent story. We find that Impatience has reasonable impacts on both physical and human capital investment. The magnitude in the most conservative specifications of Columns 4 and 8 is equal to 1/5 and 1/20 standard deviations, respectively. Risk taking does not enter in the specifications for physical capital; it is, however, positive and highly significant when the outcome is human capital (the magnitude in Column 8 is 4/10 standard deviations).

Finally, we find that neither impatience nor risk taking are significant predictors of current productivity, suggesting that we are mistakenly capturing with our proxies for preferences aspect related to the current competitiveness of the firm. The findings of Table 3 have been double checked trough a full-fledged sensitivity analysis (results are not documented; they are however available upon request). First, we have measured our investment outcomes by dividing physical investment and training costs by sales (instead than employee). Results remain nicely confirmed. Second, we have aggregated the

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[3] The inclusion of additional covariates slightly reduces the observations across specifications. However, our results remain undisputed if we run the regressions for the common smallest number of observations.

responses to the RIL questions on preferences by using a cardinal scale and dummies variables (one for each possible answer). Again, we do not find any significant discrepancy with the findings of Table 4.

4. Unobservable selection

Given that we do not have a source of exogenous variability to anchor the observed variation in preferences we have to worry that unobserved variables can explain the associations we document in Table 3. We start by noting the changes in the coefficients for the variables of interest: when we look at physical capital, the coefficient for impatience slightly increases by moving from Column 1 to Column 4; however, both coefficients go down more rapidly when the outcome is human capital (impatience reduces of 36%, risk taking goes down by 26%).

As argued by Altonji et al (2005) and Oster (2016), looking only at the changes in the coefficients when introducing additional controls is not sufficient to evaluate the potential omitted variable bias. Given that the additional control may be only a proxy of unobserved heterogeneity, we should also look at changes in R2, to understand how much the additional covariate helps in predicting the outcome. In our case, the R2 statistic increase by approximately a factor of 9 and 18, respectively for the two outcomes. By adopting the two procedures suggested by Oster (2016),[4] we find: a) the bounds for our estimates are equal to -0.042 (impatience, in the equation for physical capital investment) and -0.066 and 0.055 (respectively for impatience and risk taking in the equation for human capital investment); the degree of selection on unobservable that would explain the whole results is equal to 1.74 (physical capital) and 1.38 (human capital). These results suggest that our conclusions about the role of entrepreneur preferences for the accumulation of physical (human) capital investment are robust to a substantial degree of unobservable selection.

5. Further results

As robustness check, we analyze other outcome variables that may be considered suitable proxies of the entrepreneurs' propensity to invest in human capital at workplace.

At this aim we perform a simple regression model of the equation (1), when the dependent variables are, respectively: i) the probability to finance training investment with own funds, ii) the (log of) training costs over trainees and iii) the use of fixed term contracts.

Table 5 reports OLS estimates for the most fourth specification of equation (1).

Here, we find that impatience exerts a negative impact on both the privately financed training and the training costs per trainees. Further, risk taking does not affect the source of financing while it favors the amount of training per trainees. Finally, Table 5 indicates that impatience and risk taking are opposite predictors of the temporary employment.

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[4] Oster (2016) proposes to assume that the maximum R2 that we would obtain if we were to include all the relevant unobserved heterogeneity is 1.3 times the one that we observe including all controls. She then proposes two alternative statistics. One is to estimate a bound for the coefficient by further assuming that that selection on unobservables is proportional to the selection on the observables (we defer to her paper for full details). The other statistic is the degree of selection on unobservable with respect to the selection on observables that would explain the whole result. If the value is above 1 (equal selection) than the estimate can be considered more robust.

These results confirms previous hypothesis that entrepreneurs' impatience discourages pecuniary investments in workplace training. On the other hand, impatience may increase no pecuniary investment on human capital if we assume that open-ended contracts are a proxy of skills accumulation throughout informal/"learning by doing" activities at workplace.

[Table 5 here]

6. Conclusions

By using survey responses, we have documented – for the case of Italy's SMEs – that time and risk preferences of the entrepreneur have an important role for the investment of the firm in physical and human capital. Our findings, derived through an identification based on selection on observables, seem unlikely to reflect unobserved selection.

Table 4: OLS estimates

	ln(investment per employee)				ln(training costs per employee)				ln(sales per employee)			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
time impatience	-0.412**	-0.385***	-0.372***	-0.460***	-0.158***	-0.148***	-0.154***	-0.101***	0.031	0.005	-0.003	0.005
	[0.184]	[0.142]	[0.129]	[0.140]	[0.030]	[0.030]	[0.029]	[0.031]	[0.043]	[0.028]	[0.027]	[0.027]
risk attitude	0.206	0.174	0.162	0.094	0.106***	0.089**	0.077**	0.078**	0.011	0.026	0.018	0.012
	[0.181]	[0.165]	[0.158]	[0.169]	[0.037]	[0.036]	[0.035]	[0.037]	[0.034]	[0.032]	[0.031]	[0.030]
basic control firms	NO	YES	YES	YES	NO	YES	YES	YES	NO	YES	YES	YES
controls for the entrepreuners	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
Additional firm charactiristics	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES
N of Obs	3398	3398	3384	2997	3030	3030	3017	2718	3093	3093	3082	3082
R2	0.022	0.051	0.074	0.174	0.009	0.057	0.102	0.160	0.003	0.094	0.127	0.166

Source. RIL 2015. Note: a) Basic firm controls include fixed effects for the sector of activity, fixed effects for NUTS1 regions, firm size, the age of the firm and its legal status; b) Controls for the entrepreneur include sex, age, and education of the respondent, and an indicator for family ownership; c) Additional firm characteristics include dummies for recent past product or process innovations, an indicator for exporting firms and a set of explanatory variables for workforce composition (education, age, sex, professions and contractual arrangements of the employees, gross workers turnover). All OLS regression applies sampling weights. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A: OLS estimates

	Private provided Training	ln(training costs over trained)	share of fixed term contracts
time impatience	-0.010*	-0.088**	-0.006**
	[0.006]	[0.035]	[0.002]
risk attitude	0.010	0.088**	0.005*
	[0.007]	[0.041]	[0.003]
basic control firms	YES	YES	YES
controls for the entrepreuners	YES	YES	YES
Additional firm charactiristics	YES	YES	YES
constant	0.050	2.186***	0.368***
	[0.114]	[0.688]	[0.044]
N of Obs	3082	2720	3082
R2	0.096	0.168	0.239

Source. RIL 2015. Note: other controls include: employees education and age, firms ownership, workforce composition (female, fixed term contract, ecc), firms characteristics (foreign market, age, size, sector, region, ecc) . Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

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