



THE AGE EFFECT IN ENTREPRENEURSHIP:
FOUNDER'S TENURE, FIRM PERFORMANCE AND
THE ECONOMIC ENVIRONMENT

MARCO CUCCULELLI
*Università Politecnica delle Marche,
Department of Management and Industrial Organization
MoFiR*

GIACINTO MICUCCI
Bank of Italy

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by Marco Cucculelli and Giacinto Micucci

Marco Cucculelli

Faculty of Economics "Giorgio Fuà" - Marche P. University

Piazzale Martelli, 8, 60100 Ancona, Italy

Phone: +39-071-2207162

Fax: +39-071-2207199

Email: m.cucculelli@univpm.it

Giacinto Micucci

Bank of Italy – Ancona

Piazzale Kennedy, 9, 60100 Ancona, Italy

Phone: +39-071-2285222

Email: giacinto.micucci@bancaditalia.it

Abstract

This paper tests the effect of founder's tenure on firm performance by taking into account the impact of the changes occurring in the economic environment. We use a large dataset of founder-run firms that includes, in addition to financial data, company data directly collected through a survey of about 2,000 Italian firms. Unlike the negative relationship reported in most empirical papers, we found an inverted U-shaped relationship between founder-CEO tenure and firm performance. This relationship is strongly influenced by the characteristics of the environment in which the company competes: while experience plays a key role in fostering performance in less innovative- and less competitive sectors, a dynamic environment makes the performance of the firm less responsive to the benefits of founder tenure. From the viewpoint of policy, growing environment dynamism calls for greater efficiency of the market for corporate control, in order to assure a continued match between skills of CEOs and the external environment.

Keywords: ageing, entrepreneurship, founder-run firms, changing environment

JEL: L25, J24, G34

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1. Introduction

Several studies have examined the ways in which CEOs influence strategic choices and company performance over time (Jovanovic, 2001; Le´vesque and Minniti, 2006; Marshall et al., 2006; Sorensen and Stuart, 2000). This literature shows that CEOs do not perform uniformly over their tenure. On the one hand, experience fosters firm performance, as competence-enhancing activities implied by ageing favour the implementation of established routines (Acemoglu et al., 2006), or allow entrepreneurs to better recognise and exploit new technological opportunities (Cohen and Levinthal, 1990). On the other hand, ageing negatively affects firm performance because of inertia (Miller et al. 2001). As founders-managers grow older, they may become more reliant on their own sources of information for making decisions, more conservative, less likely to take risks, and less flexible in handling conflict (Van Praag, 2003; Marshall et al. 2006). Due to these contrasting effects of ageing, the empirical evidence gathered on the relationship between founder-CEO tenure and firm performance has not provided unambiguous results.

The turbulence of the economic environment may affect the tenure-performance relationship further, if learning is involved. When growth- and survival prospects of the firm depend on the ability of the founder-CEO to learn about the environment (Jovanovic 1982; Pakes and Ericson, 1998) and link changes in the firm’s strategy to the changing configuration of the environment (Reid, 1991; Geroski, 1995; Power and Reid, 2005), changes in the external setting may widen the gap between organizational competencies and environmental demands making the learning process less effective in sustaining firm performance. As firm cannot alter its position easily if it retains the “imprint” of the events that shaped its initial decisions (Jovanovic, 2001), the process of ageing may affect the tenure-performance relationship very intensely in highly turbulent sectors, i.e. those sectors where significant developments in technologies or rapid changes in structural conditions require sets of knowledge and skills different from those established firms possess (Hannan and Freeman, 1984).

The aim of this paper is to study the impact of the founder-CEO’s tenure on performance of the firm when economic environments are characterised by different degrees of turbulence (Beesley and Hamilton, 1984). Our principal measure of industry turbulence is given by the intensity of the use in each sector of patents granted in a

different sector, a measure that we built from the OECD Technology Concordance Report data (OECD, 2005). This index provides a direct measure of the intensity of externally driven changes that modify competitive conditions (structure) of the industry that the founder has to confront. Other measures of turbulence are used in the analysis of robustness.

Before addressing the impact of turbulence, we will explore the relationship between founder tenure and the firm's profitability as a benchmark for the analysis. The motivation for this preliminary step arises from two major limitations in the extant empirical literature: (i) the absence of empirical evidence about the different impacts on performance of the tenures of founder- and non-founder CEOs and (ii) the applicability to small- and medium sized-firms (SMEs) of the empirical findings of the studies on large companies.

About the first drawback, the current literature shows that large differences exist between founders and hired CEOs in skill endowment and capabilities at the start of the tenure of duty. When selected by the company's board, competencies of external CEOs are usually aligned with conditions facing the firm at the time of their hiring, whereas founders do not possess this advantage. Founders usually start with a large knowledge deficit and steadily learn about their jobs, organisations, and environments (Sorensen and Stuart, 2000; Lin and Huang, 2008). An intense learning process starts after founding the company and increases with tenure, bringing the firm to closely adapt to market conditions, to better performance, or even to an early exit (Teruel-Carrizosa, 2008). As a result, marginal benefits from learning may initially rise and then decline with founder tenure, thus generating an inverted U-shaped tenure-performance relationship. Conversely, hired CEOs' performances usually show a negative relationship with tenure as their skills become progressively obsolete and they eventually lose touch with the changing external environment (Miller, 1991; Henderson et al., 2006).

The second limitation concerns the field of analysis of most existing empirical studies, which primarily addresses large-sized managerial companies. Jayaraman et al. (2000) evaluate the issue in a sample of 94 listed companies from the *Forbes* Report of large US Corporations, whereas Henderson et al. (2006) use a sample of large companies whose CEOs' median tenure ranges between 4 and 6 years. In this paper, we use data

from a dataset of about 2.000 Italian SMEs run by founders with a median tenure of about 21 years.

In contrast with the constantly dwindling correlation observed for hired CEOs, our empirical results confirm the existence of an inverted U-shaped relationship between founder tenure and firm's performance. Founder tenure has a positive effect at the beginning of the firm's life cycle whereas, thereafter the positive effects progressively decline and turn negative during the maturity phase. In the sample average, the firm performance measured by return on assets (ROA) peaks at about 10 years (9 years in the case of return on sales; ROS) after which it shows a decline.

Taking into account the contribution of the environment, we find that in uncertain- or turbulent settings the match between founder and environment is less likely to be achieved and preserved by long-tenured founders than their counterparts with lower tenures. Peak performance years reduce drastically in high-turbulence sectors, whereas they increase substantially in low-turbulence sectors.

These results suggest that a long tenured-founder structure of governance may actually harm performance when the turbulence in the external environment requires prompt changes in the firm's strategic decisions. From a policy viewpoint, the importance of an efficient market for achieving corporate control is crucial for assuring an optimal match over time between the founder-CEO's skills and the environment, especially when the dynamism of the environment is substantial.

The rest of the paper is as follows: Section 2 briefly reviews the literature and Section 3 describes the data. Section 4 presents estimated results for the age-performance relationship, whereas Section 5 and 6 address the effect of the change in the environment conditions. Section 7 concludes.

2. Related literature

2.1 Age-performance relationship

Research studies on the effect of ageing on performance have covered many fields of analysis.¹ Since long economists have considered the impact of the process of ageing

¹ We refer to studies in sport (Fair, 2005), games (Charness et al., 1996), entrepreneurship (Shane, 2003), management (Hambrick et al., 1991; Henderson et al., 2006; Jayaraman et al., 2000; Miller, 1991), finance (Gimeno et al., 1997; Mayer, 2000), business venturing (Levesque and Minniti, 2006).

(of the organisation and CEO-managers) on the behaviour of firms and have found several reasons why inertia and age may go hand in hand (Jovanovic, 2001).

Reinganum (1983) shows that an incumbent may not be interested in growing and investing on new product development as intensely as a new entrant, because if it succeeds it would merely augment its market position. As a result, older firms are likely to show some inactivity as they age.

Inertia may be also induced by deliberate actions of company insiders and managers. Martimort (1999) shows that as the firm ages, insiders may find it optimal to collude against the owner, for example by relaxing their innovative effort, thus negatively affecting the ability of the firm to introduce new products. Marshall et al. (2006) suggest that as managers grow older, they become more reliant on their own sources of information for making decisions, more conservative, less likely to take risks, and less flexible in handling conflict. Jovanovic (2001) argues that older owners and managers may become progressively less aligned to external conditions as these move away substantially from their fields of expertise. In such cases, when owners may prefer not to delegate authority even if they are aware of having lost touch with operations, and the firm is likely to drift into inertia (Carroll and Hannan, 2000). Grossman and Shapiro (1982) present a model of risky choice of specialisation that may lead the firm into a “competency trap”, in which the firm will wish that it had remained a generalist. In the competency trap, the improvement in the organisational competence that accompanies the accumulation of production experience exacerbates the decline in the organisation–environment fit, because the firm becomes better at performing routines that are less and less valued by the environment (Sorensen and Stuart, 2000). In all these instances, the contribution of the founder’s experience to firm performance may grow progressively smaller, thus causing the experiential capital curve to flatten (Henderson et al, 2006; Miller and Shamsie, 2001; Colombo and Grilli, 2005; Jovanovic, 1982).

On the other hand, ageing might benefit company performance if it allows firms to better recognise and exploit the potential of new technological opportunities in related areas (Cohen and Levinthal, 1990; Rubenson et al, 1996), or to benefit from previous competence building efforts that allow them to acquire sufficient technological knowhow to deploy upcoming innovations effectively (Abernathy and Utterback, 1978; Sorensen and Stuart, 2000). Furthermore, competence-enhancing activities implied by

ageing might also favour a cumulative effect of established routines, thus increasing the appeal of existing courses of action (Stinchcombe, 1965). Therefore, ageing might favour benefits from experience and performance as well.

If the organisational outcome is a reflection of the ability of top executives, the tenure–firm performance relationship of CEOs will mirror the changing performance of CEOs through their lifecycle. Hambrick and Fukutomi (1991) and Miller and Shamsie (2001) show that tenure and experience may initially boost firm performance, because externally hired CEOs competences are aligned with environmental conditions and they possess clear ideas about how to manage their role. Then, they may eventually become overly committed to earlier formulas and find it difficult to reconsider their situation and execute new plans. This causes their performance to decline with tenure (Miller, 1991).

The founder's attitude towards risk may also affect the tenure–performance relationship: Van Praag (2003) provides evidence of an inverted U-shaped relationship in a large sample of private companies where, despite the initial positive impact of experience, ageing led the entrepreneurs to become uncertainty-averse, thus making them no longer able to make the effective entrepreneurial decisions they once made.

2.2 The turbulence of the economic environment

The tenure–performance relationship may be influenced by the variability of the external environment if the ability of the founder to learn from the environment depends on the turbulence of the environment itself (Beesley and Hamilton, 1984). In a model of active learning in which firms change their pre-entry strategy choices in response to market feedback, Geroski (1995) argued that the growth- and survival prospects of firms depend on their ability to learn about the environment and to link change in their strategy to the changing configuration of the environment. Accordingly, ageing does affect the performance of long-standing firms when they need to adjust their product- and financial policies (Reid, 1991), or when they face external turbulence with different degrees of flexibility and speed in deciding their strategies (Power and Reid, 2005). As the effect of ageing on the organization–environment fit depends on the rate of adjustment of internal organisational routines relative to the pace of environmental change (Hannan and Freeman, 1984), the gaps between organizational competencies

and environmental demands may widen with time, particularly in industries where significant developments in technologies require different sets of knowledge and skills from those possessed by established firms. If firms retain the “imprint” of the events that shaped their initial decisions and find it hard to change to remain in tune with the environment when they age (Jovanovic, 2001), their position will deteriorate compared to that of the flexible new entrants. Therefore, ageing may affect the tenure-performance relationship more in a changing environment than in a static environment. Along these lines, Lazaer (2005) and Andersson et al. (2007) show that a changing environment can affect a firm’s value because talented people are more valuable in a turbulent environment than in a non-turbulent one. Thus, environmental turbulence at industry level, as proxied (signified) by sectoral industry characteristics like intensity of competition and innovation, and the rate of change in demand- and supply conditions, may provide a useful perspective from which to evaluate the tenure–environment relationship.

3. Data

Publicly available company data do not usually report major facts relating to a firm’s life, such as its starting date and the founder’s age at its inception. This lack of information is even worse for companies in the small business sector, whose data can be ascertained only by a direct interview.

We have built up a dataset by matching two complementary sources: a cross-sectional survey dataset, collected directly from companies through a questionnaire-based telephone interview, and a large company accounts dataset from Cerved². We have merged the survey data with the balance sheet data in order to perform the econometric analysis. For the survey, we selected a large set of non-farm, non-service companies in the manufacturing sector. The survey was restricted to four Italian regions that share some common features in the organisation of the industry (presence of “Made in Italy” industries and extensive presence of industrial districts), even if the stage of

² Cerved is an authoritative- and reliable source of information on Italian companies. Information is drawn from official data recorded by the Italian Registry of Companies and from financial statements filed with the Italian Chambers of Commerce. Cerved provides information for a large number of joint stock-, public-, and private limited share companies and limited liability Italian companies (Spa & Srl). It is compulsory for companies to file these data. The information filed include credit reports, company profiles, and summarised financial statements (balance sheet, profit & loss accounts and ratios). Companies update their financial statements annually.

development in each region differed slightly from that in the others. Major industry specialisations included fashion (clothing and footwear), wood and wooden furniture, light mechanical industry, and manufactured plastic products. We surveyed about 7,500 companies by telephone in the period March–July 2006 and got back altogether 3,548 questionnaires. In the second step, we merged the survey data with the financial data these companies reported in the Cerved database, in order to create a sample comprising only those founder-run companies for which financial data were available for the period of study (1999-2004). By so merging, we ended up with a sample of more than 11,000 observations (relating to 1,945 firms for 6 years).

Statistics for the complete sample, broken down by region and industry, are summarised in Table 1. Founders' age averaged 56, with a standard deviation of 9 years. The mean founder tenure is 21 years, whereas the founder's age in the year of the firm's creation was about 33. Almost three firms out of four have less than 50 employees. As expected, smaller firms have younger founders and those with shorter tenures. On the contrary, no substantial difference was observed in the age of the founder at the firm's inception, which is approximately the same across different sizes of firms.

[Table 1 about here]

As far as financial data are concerned, average ROA (Return on Assets) and ROS (Return on sales) are about 9% and 7%, with the maximum value slightly lower than 40% and 30%, respectively, for ROA and ROS.³ The sample firms' average total assets are 6.5 millions.

[Table 2 about here]

³ Foster et al. (2008) have recently reported the focus of their analysis of the productivity–survival link to be the viability of a (accounting) profitability measure of performance). They argue that the productivity–survival relationship is a simplification, because selection is on grounds of profitability and not productivity (though the two are probably correlated). Productivity is only one of the possible idiosyncratic factors that determine profits.

4. Founder tenure and firm performance

If the role of the experience is crucial in the early tenure of the founder, an inverted U-shaped tenure–performance relationship may arise between founder tenure and company performance, with an upward pattern in the early phase of the founder’s tenure and a declining performance trend because of organisational senescence (Henderson et al, 2006).

We tested the tenure–performance relationship by running a pooled OLS regression of the following equation:

$$(1) \pi_{it} = \alpha_0 + \alpha_1 Tenure_{it} + \alpha_2 (Tenure_{it})^2 + controls + \varepsilon_{it}$$

where π_{it} is the dependent variable, expressed by the ROA and ROS of the firm i at time t . *Tenure* indicates the number of years of founder management since the commencement of the firm⁴, whereas *Tenure*² (the square of the tenure of the founder) allows for non-linearities in the tenure–performance relationship (Agarwal et al., 2008). Controls include three different sets of variables. Firstly, a group of controls that the empirical literature has found influences firm performance, that is the size of the company (which takes into account the moderating role of the organisation in the founder tenure–firm performance relationship; Sorensen and Stuart, 2000) and firm leverage (which controls for differences in firm-specific components of risk). Secondly, as we use a pooled estimation method, controls for year, sector (3-digit SIC), and geographical region are included. Finally, as the different ages of the founders at the time of commencement may imply differences in the efficiency in the start-up process and affect post-entry performance (Cabral and Mata, 2003), we control for the founder’s previous experience by including the founder’s age at the founding of the company (Henderson et al, 2006). We also control for a potential cohort effect by including a separate dummy variable for each decade of birth of the firm (Blanchflower and Oswald, 2007).

⁴ Cabral and Mata (2003) stated that even if the age of the founder at the starting of the company sums up his ability and experience, as the firm grows, the effect of firm-specific experience swamps that of previous general experience, so that entrepreneurs’ tenure becomes a determinant of the behaviour and performance of surviving companies.

When only the linear term is considered (Table 3.a for ROA and 3.b for ROS, column I), the impact of the tenure of the founder on firm performance turns out to be negative. When non-linearity is allowed estimated results show a positive coefficient for the linear term and a negative one for the quadratic term (both significant). Therefore, after a period of time in which the founder tenure benefits performance, its contribution to profitability turns negative. This combined effect generates an inverted U-shaped relationship.

[Table 3.a about here]

[Table 3.b about here]

Figure 1 shows the simulated relationship obtained from the estimated coefficients for *Tenure* and *Tenure*² from Tables 3a and 3b (column V). The ROA peaks after about 10 years, whereas the peak year for ROS is 9 years. Both curves show a rather similar behaviour, the only difference being the downward shift of the ROS curve which reflects the lower average level of the variable.⁵

[Figure 1 about here]

5. Tenure–performance relationship in turbulent environments.

If the changes that occur in industries bring about progressive deterioration with time in the quality of the organisation–environment fit (Geroski, 1995), a fast changing environment may cause earlier disappearance of the benefits from experience than in a more stable environment (Jovanovic, 2001). As a result, the inverted U-shaped relationship between tenure and performance is likely to become more concave with greater change in the external environment. At the same time, the peak year may reduce drastically in a turbulent environment, because it makes the initial business model become obsolete earlier. Therefore, ageing is expected to weaken the organizational

⁵ As the simulated relationship for ROA and ROS in Figure 1 does not include the intercept, the level of the two variables reported in the vertical axis differs from the actual data summarised in Table 2.

performance more in a changing environment than in a static environment, thus making longer tenure particularly harmful in dynamic environments (Jovanovic, 2001; Segarra and Callejon, 2002).⁶

In order to operationalise the concept of changing environment, we used different measures of environmental drift at the sectoral level. Our preferred measure — the share of patents granted by sector of use (*SoU*) derived from the OECD Technology Concordance (OTC) Report — aims to quantify the impact of externally generated technological advancements at the sectoral level. The OTC Report (OECD, 2005) maps separately patent categories into the economic sectors responsible for their creation (*IoM* index) and for their subsequent use (*SoU* index). While *IoM* represents the innovative activity within each sector, the *SoU* index measures the share of total patents that are used in each sector, regardless of whether it is the sector that produced the patent. In this regard, it provides a measure of the intensity of externally driven environmental change and substitutes for exogenous technological changes in the industry that the founder has to face. The OECD index is calculated by classifying patents (by nationality of applicant) for six major applicant nations — including Italy — in the EPO database in 1998. The expected effect in our sample is that the larger the share of patents used in a sector, the stronger the technological drift of the environment in that sector, thus making the founder tenure less valuable for firm performance.

We re-estimated the equation (1) by breaking up the sample according to the median score of the distribution of the *SoU* variable. Table 4 summarizes regression estimates for ROA and ROS as the dependent variables. While the contribution of the tenure to performance appears positive in low-turbulence sectors, the benefits of ageing are rapidly offset in high-turbulence sectors (use of patents above the median score of the distribution). Figure 2 presents the simulated tenure–performance relationship from estimated coefficients in Table 4.

[Table 4 about here]

⁶ A positive effect of early tenure may be delineated in turbulent settings: motivations of the founder, large efforts in running the company, flexibility in following the market and quick adaptability can allow the company to benefit from young tenure even in a changing environment, especially when incumbents are slow to react. The absence of consolidated routines can favour the entrant in establishing and developing new business models, which may benefit firm performance substantially in the first years after their introduction.

[Figure 2 about here]

Performance peaks on the average in about five years in high-turbulence sectors, with a steep rise in the early years of the founder tenure followed by a sharp decline, becoming negative after about 15 years. On the contrary, *Tenure* has a positive impact in sectors with a low use of externally produced patents, whereas the (negative) squared term is not statistically different from zero. Therefore, even if a slightly concave curve can be assumed the impact of the modest environmental drift does not seem to hurt performance substantially, whereas the role of experience appears positive. Similar findings are observed for ROS.

For robustness, we used an alternative measure of turbulence: the coefficient of variation of industrial production, which captures the variability in the demand conditions through monthly changes in industrial production. The index is computed using data for the Italian manufacturing industry at 2-digit level in the interval 1980–2005. The rationale for this measure relies on Lazaer (2005) and Andersson et al. (2007), who argue that the impact of the decision maker's ability (the founder, in our sample) on the company's value may change according to the turbulence in the economic environment. When using the coefficient of variation of the industrial production instead of the SoU variable, the estimated results confirm that the positive impact of tenure is much lower in high-turbulence sectors than in low-turbulence ones. Again, for the use of patents tenure matters but the benefit from accumulated experience seems to decay rapidly if the environmental drift is substantial.

6. Role of intensity of competition.

In recent years, the competitive pressure in manufacturing industries has intensified dramatically due to economic integration in trade and services and the new role of emerging countries. Mature- and low-technology industries have been most affected by the increase in competition, but almost all manufacturing sectors have witnessed a marked decline in profitability. The change in sectoral conditions due to the intensified competitive pressure has produced an exogenous shock that incumbent firms have had to face. As for patents, this pressure has probably affected the tenure–performance

relationship by making performance less sensitive to age-accumulated experience or more vulnerable to age-related-inertia.⁷ Consequently, the positive effect of the accumulated experience would be expected to be confined mostly to sectors where the competitive pressure has been lower, i.e. in sectors of low intensity of competition.

We have measured the intensity of competition using the inverse of the Lerner index of competition, which is $(1 - \text{profits}/\text{sales})$, calculated as the average across the entire firm-level database for the period 1998–2002 (Aghion et al., 2005; Bloom and Van Reenen, 2007). Exhibit 1 summarizes the 21 sectors used in our analysis according to the intensity of competition. High mark-up (low competition) sectors are summarised on the left of the table, whereas high competition sectors are on the right. The table also categorizes sectors according to their intensity of use of patents as previously discussed (SoU) and segregates them accordingly along the rows. Separate estimations for the four groups in Exhibit 1 (reported in Tables 5a and 5b) confirm the different role of tenure-related experience in sustaining the performance in each sector. While experience appears valuable in those sectors where the intensity of competition is low, the opposite holds in sectors of high intensity competition, regardless of the relevance of the use of patents. In these sectors⁸, which represent a large share of the manufacturing industry in many European countries including Italy, a protracted tenure of the founder may turn out to be harmful for company performance, thus calling for new- or improved governance models able to make the decision making process more effective.

[Table 5.a about here]

[Table 5.b about here]

7. Conclusions

In this paper, we have addressed the issue of the effect of founder tenure on company performance using a large dataset of Italian private, founder-run small- and medium size firms.

⁷ Aghion et al. (2005) find clear non-linearities in the relationship between competition and innovation.

⁸ This categorization closely resembles the sectoral taxonomy proposed by Pavitt (1984), with the “supplier dominated” group almost overlapping sectors in cell n.4, “specialised suppliers” and “science-based” sectors in cell 2, and “scale intensive” sectors in cell 3.

Empirical results show the presence of an inverted U-shaped relationship between tenure and firm performance over time: in the early tenure, ageing affects performance positively but after a peak, its positive effect gradually declines.

The impact of the experience, measured as the number of years the founder has run the firm, depends on the sectoral level of turbulence. In particular, our findings show that a dynamic environment reduces the time interval in which tenure is fruitful for firm performance. While company performance in low-turbulence sectors appears to gain greatly from the founder tenure, ageing affects firm performance negatively in sectors where innovation is high.

Understanding the impact of the tenure of the founder may become quite relevant when cultural- or socio-economic factors make the founder actively involved in running the company. It could be the case of small entrepreneurial firms, or family-run companies, in which the founder is actively involved in the company's life and its management. In these companies, the founder may run the risk of becoming progressively unsuitable to meet new market conditions, to the detriment of firm performance. In this sense, a model of corporate governance largely focused on long-tenured, inflexible founders may negatively influence the ability of the system to react promptly to changing competitive conditions and tougher external competition. The weak performance of the Italian economy during recent turbulent years might be an example of this type of effect. This evidence stresses once more the importance of greater efficiency of the market for corporate control.

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Table 1

DESCRIPTION OF THE SAMPLE (FIRMS RUN BY FOUNDER)*(number and % of firms; average age)*

VARIABLES	Sample		Founder tenure		Age of the founder in the year of firm's creation		Age of the founder	
	N.	%	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Total Sample	1,945	100.0	24.7	10.4	33.4	9.1	58.1	9.1
Sectors								
Foods	69	3.5	25.0	11.3	35.2	10.9	60.2	9.4
Textile & Clothing	146	7.5	22.8	10.6	34.8	9.4	57.6	9.5
Footwear	157	8.1	22.7	10.1	33.3	8.8	56.0	9.0
Wood, paper	154	7.9	26.5	10.5	32.1	9.1	58.6	8.3
Chemicals, rubber and plastic	150	7.7	25.6	10.5	34.5	9.6	60.1	9.2
Minerals (non-metals)	114	5.9	25.2	10.7	33.8	9.6	59.0	9.4
Metalworking	398	20.5	25.2	10.2	32.5	8.3	57.7	9.3
Mechanical industry	333	17.1	24.7	10.7	33.8	8.9	58.5	8.6
Machinery, appliances, vehicles	216	11.1	23.3	9.1	34.1	9.3	57.5	9.3
Furniture, toys, jewels	208	10.7	25.4	10.7	32.5	8.9	57.8	9.0
Regions								
Veneto	750	38.6	25.7	10.1	32.5	8.8	58.2	8.6
Emilia-Romagna	598	30.7	25.7	10.3	33.9	8.9	59.7	9.1
Marche	524	26.9	22.8	10.9	33.6	9.5	56.4	9.5
Abruzzo	73	3.8	18.9	7.4	37.7	9.3	56.6	8.1
Size								
>=10 employees < 50	1,546	79.5	23.7	10.2	33.7	9.2	57.4	9.1
>= 50 employees <= 200	399	20.5	28.3	10.3	32.4	8.4	60.7	8.5
Year of creation								
Before 1970	283	14.6	41.6	5.2	25.9	6.7	67.4	7.4
1970 – 1979	589	30.3	30.4	2.9	29.7	6.5	60.1	6.6
1980 – 1989	662	34.0	20.9	3.1	35.3	7.8	56.3	7.8
1990 - 2005	411	21.1	10.9	3.3	40.9	9.1	51.8	9.0

Source: Survey of Marche P. University.

Table 2

SUMMARY OF DESCRIPTIVE STATISTICS

VARIABLES	Mean	Median	Std. dev.	Min. value	Max. value
ROA	9.2	7.7	7.1	-9.9	39.9
ROS	7.1	6.1	5.4	-9.9	29.8
Founder tenure	21.0	21.0	10.1	2.0	56.0
Age of the founder in the year of firm's creation	32.9	32.0	8.7	16.0	67.0
Total assets	6.5	3.6	8.3	0.2	121.3
Leverage	76.3	79.9	16.8	12.2	99.0

Source: Survey of Marche P. University and Cerved. Size is the total assets (in millions euro). Leverage is the book value of total debt divided by the book value of total assets. The Founder tenure and the Age at founding variables are in absolute values.

Table 3a

THE RESULTS OF OLS-POOLED REGRESSION
OF FIRM PERFORMANCE ON FOUNDER TENURE: ROA

REGRESSION SPECIFICATION	ROA				
	I	II	III	IV	V
Founder tenure	-0.20 *		-0.34 **	3.18 **	3.58 **
(Founder tenure)**2				-0.75 **	-0.78 **
Age of the founder in the year of firm's creation		0.21	-0.58 **	-1.16 **	-1.12 **
Cohort effects: < 1970					-0.65
1970 -79					-0.29
1980-89					-0.63 *
Size	-1.65 **	-1.66 **	-1.65 **	-1.62 **	-1.62 **
Leverage	-0.14 **	-0.14 **	-0.14 **	-0.14 **	-0.14 **
Year dummies	yes	yes	yes	yes	yes
3 digit-SIC dummies	yes	yes	yes	yes	yes
Area dummies	yes	yes	yes	yes	yes
Adj. R-Square	0.16	0.16	0.16	0.16	0.16
N. Observations	11,767	11,767	11,767	11,767	11,767

Source: Survey of Marche P. University and Cerved. Size is the natural logarithm of total assets. Leverage is the book value of total debt divided by the book value of total assets. The Age variables are in log. The regression includes the intercepts. T-statistics from heteroskedasticity-consistent standard errors appear in parentheses.

Table 3b

**THE RESULTS OF OLS-POOLED REGRESSION
OF FIRM PERFORMANCE ON FOUNDER TENURE: ROS**

REGRESSION SPECIFICATION	ROS				
	I	II	III	IV	V
Founder tenure	0.01		-0.11	1.75 **	2.23 **
(Founder tenure)**2		-0.42 *		-0.39 **	-0.51 **
Age of the founder in the year of firm's creation			-0.48 *	-0.79 **	-0.75 **
Cohort effects: < 1970					0.08
1970 -79					0.12
1980-89					0.26
Size	-0.18 **	-0.17 **	-0.18 **	-0.16 **	-0.16 **
Leverage	-0.11 **	-0.11 **	-0.11 **	-0.11 **	-0.11 **
Year dummies	yes	yes	yes	yes	yes
3 digit-SIC dummies	yes	yes	yes	yes	yes
Area dummies	yes	yes	yes	yes	yes
Adj. R-Square	0.16	0.16	0.16	0.17	0.17
N. Observations	11,767	11,767	11,767	11,767	11,767

Source: Survey of Marche P. University and Cerved. Size is the natural logarithm of total assets. Leverage is the book value of total debt divided by the book value of total assets. The age variables are in log. The regression includes the intercepts. T-statistics from heteroskedasticity-consistent standard errors appear in parentheses.

Table 4

**THE RESULTS OF OLS-POOLED REGRESSION
OF FIRM PERFORMANCE ON FOUNDER TENURE**

REGRESSION SPECIFICATION	ROA		ROS	
	Low use of patents sector	High use of patents sector	Low use of patents sector	High use of patents sector
Founder tenure	3.12 **	3.28 **	1.53 *	2.01 **
(Founder tenure)**2	-0.36	-1.16 **	-0.10	-0.80 **
Age of the founder in the year of firm's creation	-1.85 **	-0.61	-1.55 **	-0.13
Size	-1.44 **	-1.57 **	-0.03	-0.05
Leverage	-0.12 **	-0.17 **	-0.12 **	-0.15 **
Cohort effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
3 digit-SIC dummies	yes	yes	yes	yes
Area dummies	yes	yes	yes	yes
Adj. R-Square	0.14	0.24	0.18	0.24
N. Observations	4,708	4,628	4,708	4,628

Source: Survey of Marche P. University and Cerved. Size is the natural logarithm of total assets. Leverage is the book value of total debt divided by the book value of total assets. The age variables are in log. The regression includes the intercepts. T-statistics from heteroskedasticity-consistent standard errors appear in parentheses.

Table 5a

**THE RESULTS OF OLS-POOLED REGRESSION
OF FIRM PERFORMANCE ON FOUNDER TENURE: ROA**

REGRESSION SPECIFICATION	By level of competition and use of patents			
	Low competition low patents	Low competition high patents	High competition low patents	High competition high patents
Founder tenure	6.78 **	4.24 **	-0.34	0.87
(Founder tenure)**2	-1.35 **	-1.12 **	0.48	-0.74 *
Age of the founder in the year of firm's creation	-3.43 **	0.98 *	-1.28 *	-0.92
Size	-0.94 **	-1.44 **	-1.83 **	-1.09 **
Leverage	-0.13 **	-0.15 **	-0.07 **	-0.10 **
Cohort effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
3 digit-SIC dummies	yes	yes	yes	yes
Area dummies	yes	yes	yes	yes
Adj. R-Square	0.15	0.19	0.16	0.24
N. Observations	1,795	2,604	2,745	1,891

Source: Survey of Marche P. University and Cerved. Size is the natural logarithm of total assets. Leverage is the book value of total debt divided by the book value of total assets. The age variables are in log. The regression includes the intercepts. T-statistics from heteroskedasticity-consistent standard errors appear in parentheses.

Table 5b

**THE RESULTS OF OLS-POOLED REGRESSION
OF FIRM PERFORMANCE ON FOUNDER TENURE: ROS**

REGRESSION SPECIFICATION	By level of competition and use of patents			
	Low competition low patents	Low competition high patents	High competition low patents	High competition high patents
Founder tenure	3.64 **	3.12 **	-0.64	-0.23
(Founder tenure)**2	0.67 *	-0.87 **	0.50 *	-0.30
Age of the founder in the year of firm's creation	-2.87 **	0.49	0.67	-0.41
Size	-0.32 **	0.02	-0.32 **	-0.01
Leverage	-0.11 **	-0.14 **	-0.08 **	-0.09 **
Cohort effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
3 digit-SIC dummies	yes	yes	yes	yes
Area dummies	yes	yes	yes	yes
Adj. R-Square	0.17	0.21	0.19	0.17
N. Observations	1,795	2,604	2,745	1,891

Source: Survey of Marche P. University and Cerved. Size is the natural logarithm of total assets. Leverage is the book value of total debt divided by the book value of total assets. The Age variables are in log. The regression includes the intercepts. T-statistics from heteroskedasticity-consistent standard errors appear in parentheses.

EXHIBIT 1 – SECTORS BY THE INTENSITY OF COMPETITION AND THE INTENSITY OF USE OF PATENTS PRODUCED IN OTHER SECTORS

Sectors by the intensity of use of patents produced in other sectors	Sectors by the intensity of competition	
	Low intensity of competition	High intensity of competition
Low use of patents	- Wearing, clothing - Non metallic minerals - Printing & publishing - (1)	- Food - Textile - Footwear - Wood products - Rubber, plastic - Metal products - Furniture (4)
High use of patents	- Chemicals - Machinery - Electrical appl. - Computing/ICT - Office mach. - Radio, TV - Medical appl. - Other instruments (2)	- Paper - Coke, petroleum - Basic metals - Motor vehicles - - - - (3)

Figure 1- *Estimated relationship between founder tenure and firm profitability for ROA and ROS. The horizontal axis represents the founder tenure in logs.*

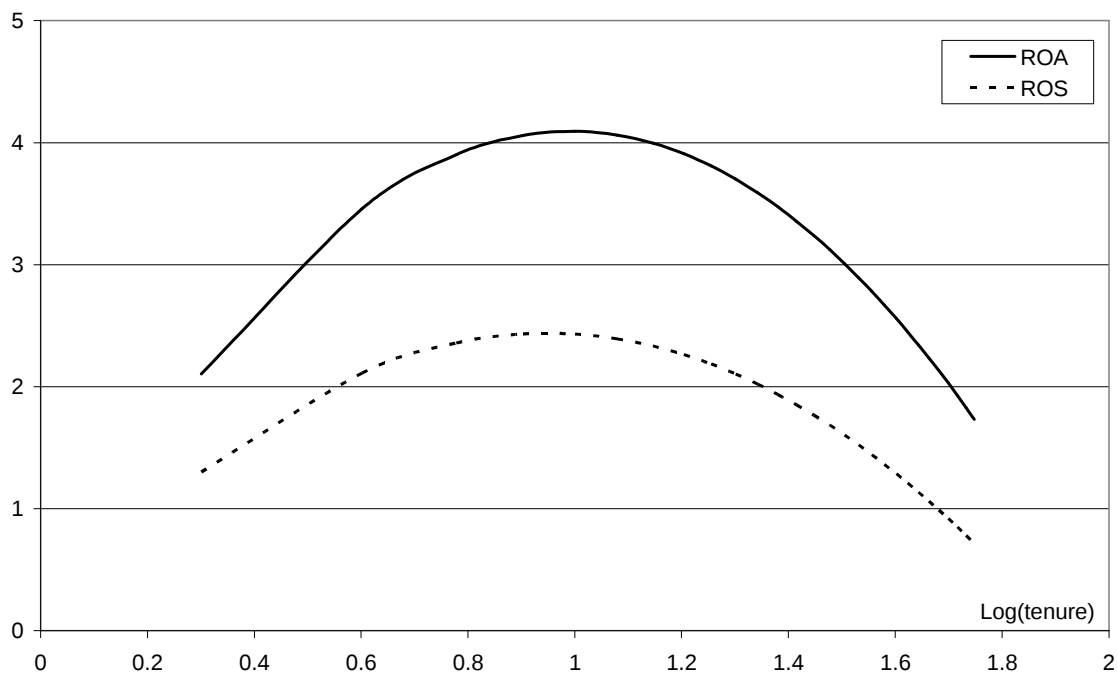


Figure 2 - *Estimated relationship between founder tenure and firm profitability (ROA) in high- and low turbulence sectors as measured by use of patents. The horizontal axis reports the founder tenure in logs. Negative performance arises because of the extension of the simulated relationship to the maximum tenure in the sample.*

