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## Conference Paper

# Entrepreneurship As Regional Development Catalyst

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## **Entrepreneurship as Regional Development Catalyst**

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## 1. Introduction

A broad range of literature has been developed to investigate what drives economic growth. In this field a stream of research has focused on the determinants of firm growth as businesses are important contributors to overall economic growth.

Empirical works have concentrated the attention on traditional determinants of firm performance as, for example, age, size, industry, legal form and location (Storey, 1994; Audretsch, 1995; Almus and Nerlinger, 1999; Davidsson *et al.*, 2002) and have demonstrated that small, young and independent businesses grow at fastest rate. However, in a knowledge-based economy, where value-relevant assets are expected to consist mainly of intangible and non-marketable assets, firms performance may be influenced by factors other than the traditional ones. In particular, a growing interest in the literature has been deserved to human and intellectual capital as critical factors shaping firm performance. Among them entrepreneurship is assumed to play a relevant role, as this kind of intangible asset promotes the spillover of knowledge, becoming crucial in building both firms' and regions' innovation capability and strengthening learning skills.

Entrepreneurship is more and more considered a key driver of economic performance. Many authors have highlighted that research on entrepreneurship is still at a pre-paradigmatic phase, with the existence of many competitive theories and schools of thought and a lack of common starting points. Hebert and Link (1989) identify and classify three different schools of thought. Firstly, the *German tradition*, based on the work of Thünen and Schumpeter, emphasizes the role of the entrepreneur in the process of economic growth and relates economic development to dynamic and innovative entrepreneurs. Secondly, the *Chicago tradition*, whose main authors are Knight and Schultz, which is inspired to the neoclassical ideas of free markets and libertarianism, although adopting a less formal methodology in favor of the more practical results obtainable through partial equilibrium analysis. Finally, the *Austrian tradition*, based on the contributions of von Mises, Kirzner and Von Shackle and in opposition to the formal neoclassical theories based on well-defined actors and processes, underlines the

spontaneous order emerging in economic systems and the role of uncertainty and tacit knowledge that prompt evolutionary processes.

Recent works in the literature on this research area (see Saxenian, 1994; Audretsch and Keilbach, 2004; Cassia, Fattore and Paleari, 2006) suggest that there is a positive link between entrepreneurship capital and the creation of new firms and businesses. The literature focuses on two main aspects of entrepreneurship: the intuition of new business opportunities and the deployment of new ideas in the market. This concept is consistent with the definition of entrepreneurship proposed in OECD (1998), which defines the entrepreneurs as agents of change and growth in a market economy, able to accelerate the generation, dissemination and application of innovative ideas, willing to take risks to see if their intuitions are right.

In relation to these concepts, the aim of this research is to highlight the entrepreneurial dimension behind the creation of firms formed around new business ideas in a knowledge-based economy and to underline the drivers at regional level as catalyst of the local development. To this purpose, we focus on companies listed on the Alternative Investment Market (henceforth, AIM), a market dedicated to young and growing companies in both traditional and high-technology based industries. We consider companies listed on AIM an interesting sample for our study for two main reasons. First, such a firms are formed around new business ideas and, thus, represent a relevant entrepreneurial model. Secondly, the sample does not suffer of industry biases, as companies listed on the AIM cover the overall industry system. The AIM was launched in 1995, allowing a large number of SMEs to go public in the UK, and, today, is recognized as the most successful secondary market in Europe.

The work is articulated on two levels. Firstly, we investigate the post-IPO (Initial Public Offering) performance of listed firms, during the decade going from 1995 to 2005, trying to highlight the determinants shaping that performance and to underline the role of entrepreneurship. Secondly, we emphasize the relation between the determinants of firm performance and the regional environment. Actually, local features may influence and enable the formation of those factors shaping firms' performance. In this vein, we try to

draw some indications both at national and regional level supporting policy makers aiming to foster new firms' formation and growth.

Our study may contribute to this stream of literature by analyzing the growth factors of firms in a specific entrepreneurial phase, i.e. an IPO on a secondary market. First, an initial public offering is one of the most notable entrepreneurial settings, being characterized by a high degree of uncertainty. A firm undertaking an IPO and entering the arena of public offerings faces new challenges and pressures, such as the acceptance and monitoring activities from a new variety of stakeholders. Moreover, the AIM is a secondary market dedicated to young and growing companies, thus facing uncertainty and risks due, for example, to the lack of operating history and reputation on the market. Under these circumstances, such companies are to a large extent influenced by the external environment.

The paper is organized as follows. In the first part we outline the theoretical framework underlying the paper and clarify the research background of the study. In this section we shed light on the relation between entrepreneurial and regional dimensions behind firms' performance and describe the theoretical model that guides our study. In the methodological section we describe the dataset, the sample of companies listed on the AIM and the variables used in our model. Next, we describe the results of our analyses. Finally, we discuss our interpretation regarding our findings and try to carry some policy implications. We conclude underlining limitations and further research.

## **2.Theoretical Framework**

The stream of literature on entrepreneurship and growth emphasizes the link between entrepreneurial dynamics and economic growth taking into account different units of analysis: firms, industries and regions. In the research area of regional science, concepts as Regional Innovation Systems (Freeman 1987, 1991, Lundvall 1992, Nelson 1993) and Triple Helix (Etzkowitz and Leydesdorff, 1997, 2000) recognize the active role of territorial actors within regional development dynamics and give relevance to the institutional foundations of regions' competitive advantage, for example in the areas of

education, research and development and financial services. Since Marshall (1890) and until the end of the Nineties, the model of local development has always been bi-polar, built upon two fundamental components of change, firms and local institutions. More recently, Etzkowitz and Leydesdorff (1997, 2000) highlight the active presence of an additional variable, the university, in particular if specialized in technical and scientific studies. These conceptual models try to account for the existence of a new configuration of institutional forces (university, firms and local institutions) involved in a 'spiral' of relations. Within these models the social interaction between different actors aims at the production, diffusion and application of new and economically useful knowledge.

The premise behind our study is that the proactive role of the three local actors, specifically financial institutions, universities and firms, may impact businesses performance. Actually, some of the determinants of companies growth can be identified at firm level and grouped under the label of entrepreneurship. We argue that the local environment may directly impact and facilitate the generation of those factors determining firms' performance, in particular through institutional organizations. The habitat in which economic agents operate – financial, educational and cultural – directly influences their activity and hence economic development. In sum, institutions provide a framework that guides business activity, lowers uncertainty and facilitates the coordination of knowledge and intangible assets.

In our work we thus focus on public companies listed on the AIM trying to highlight three dimensions of entrepreneurship straightly related with the three local dimensions: availability of financial assets and risk taking, skills and education, work experiences and learning. A brief review of the literature may allow us to identify for each dimension some of the relevant variables influencing firms' performance.

First, concerning the risk level of businesses, previous researches show how young and small firms are associated with a high risk as they lack of past experience and there is no complete information on their operational activities and quality. For this reason small and young enterprises are often subject to 'credit rationing' (Jaffe and Russel, 1976; Stiglitz and Weiss, 1981; Fazzari *et al.*, 1988; Winker, 1999). However they have the opportunity to attract investments from venture capitalists, which provide equity to those firms with a

high risk (Audretsch and Lehman, 2004). Empirical evidence also shows how younger and smaller firms grow more than the older and larger ones, while the effect of venture capitalists investments seems to be more ambiguous (Audretsch and Lehman, 2004).

Secondly, empirical research offers support for relationships between entrepreneurial attitudes – for example cognitive ability, creativity, intuition – and knowledge and executive competence. Bates (1990) shows that owner educational background is a factor influencing the success of small business firms. He underlines how highly educated entrepreneurs are less likely to fail. Audretsch and Lehmann (2004), in their study on the determinants of the post-IPO performance on the German Neuer Markt, suggest that human capital, measured as the educational background of the owner and the board, is one of the most significant determinants of the market performance of listed firms.

Finally, previous works highlight how firms' performance may depend on executive managers competences and experiences. Rosemberg and Saloner (2000) argue that the survival of the firm is influenced by the capabilities of the board. Lester *et al.* (2006) find that the prestige of top management teams (TMTs), measured on the bases of previous experiences and educational level, at the time of an IPO enhances organizational legitimacy and thereby influences investor valuations.

### **3. Dataset set and Methodology**

#### **Dataset**

In order to highlight the relationship, if any, between firm performance and entrepreneurship, we refer to EurIPO<sup>1</sup> database which collects data on 3,000 operating companies that went public on the main European markets (London, Frankfurt, Euronext, and Milan) through IPO during the period 1985-2005. We focus on the subset of companies

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<sup>1</sup> EurIPO is a database containing information on European public companies. The dataset is organized in three sections: Accounting, collecting data from the balance sheets, e.g., assets, equity, sales, EBIT and capital expenditure; Offer, which brings together data on the offering, such as pricing methodology, number of share, cost of the IPO and Book Value; Ownership, gathering information on main shareholder, founder, CEO and board of directors. Additional information referring to intellectual property rights are included.

listed on the AIM from 1995 to 2005. The dataset combines publicly available information (e.g., year of establishment, listing date), accounting data from balance sheets (the main variables of consolidated financial statements in a range of three years before and three years after the listing date of each firm) and data related to both the offer and the ownership structure from IPO prospectuses.

To the purpose of analyzing the influence of intangibles assets (such as human, organizational and entrepreneurship capital) on firm performance, we mainly focus on offer and ownership set of data. The IPO prospectus, accordingly, is the primary source of data for our study. It is an important document which gives detailed information about the firm such as the operating history, firm products and ownership structure. Additionally, it includes biographical information regarding the founder, CEO and the firm executive management.

### **Sample**

Our sample consists of 665 companies listed on the AIM. AIM is regarded as the most successful secondary market in Europe, brought forward as an example by other stock exchanges in mainland Europe when trying to (re)launch second-tier markets. A number of different reasons made this market interesting for our purposes.

Firstly, AIM is not a specific market for high-tech companies and no specific suitability criteria are requested to qualify for the listing. The firms listing on the AIM are indeed formed around new business ideas, the main factor behind the entrepreneurship capital creation. As Audretsch and Keilbach (2004) argue, entrepreneurship capital shows up through the creation of new firms, involving entrepreneurs, who are willing to deal with the risk of creating new firms, and investors, that are willing to share the risks and benefits involved.

Furthermore, firms quoted on the AIM operate both in science and non-science based industries. Accordingly, compared to the new stock markets, the AIM allows for a more extensive analysis without industry specificities. Actually, entrepreneurship can be considered a firm- or a region-specific factor rather than an industry-specific factor.



Moreover, the AIM is a secondary market dedicated to young and growing companies. In accordance with the corporate life cycle model by Quinn and Cameron (1983), these firms are in the entrepreneurial phase, characterized by high innovativeness and entrepreneurial creativity, and also a high level of uncertainty.

### **Variables**

The variables we used in this work can be grouped in three classes. The first one refers to the degree of risk associated with the firm, the second one to the education levels of the board, the third represents the learning dynamics. Moreover a set of control variables has been used to provide higher robustness to the analysis. On a different ground, a further distinction can be introduced between those variables changing over time (e.g. Firm Size, GDP growth), and those which instead are time-invariant being all of them calculated at the time of the IPO (e.g. proxies presence of venture capitalists and educational level). In the remainder of this section we provide an outline of the indicators we used in the econometric test.

Consistently with previous research on small businesses and entrepreneurship (Lau Man and Chow, 2004; Sadler-Smith et al., 2003; Swierczek and Ha, 2003; Covin and Covin, 1990; Wolff and Pet, 2006), the dependent variable of our model is a measure of firms' performance. Actually, different variables can be considered as proxies of firm performance, e.g. sales or market growth, number of employees and financial outcomes. Based on recent works in the literature (Wolff and Pett, 2006) we use sales growth which is both a measure of firm contribution to the overall economic growth and a proxy of owners and managers competencies. The sales growth is computed as the average growth rate of firm sales at each period  $t$ . Such a rate has been calculated as the difference between logs of sales yielded in two subsequent periods. In particular we focus on the post-IPO period of time.

As far as independent variables are concerned, we grouped them in three categories: risk-related, education-level and learning variables.

Firstly, the risk-related variables are *Firm Age*, *Firm Size* and *Venture Capitalist*. The first two are among the wide range of independent variables used to investigate firms'

growth rate determinants (Davidsson *et al.*, 2002) and refers respectively to the year the firm has been founded (*Firm Age*) and to the logarithm of sales (*Firm Size*). Consistently with the life cycle model (see Quinn and Cameron, 1983; Miller and Friesen, 1984), actually, an enterprise starts as young, small and simple, showing a high rate of growth. However, along the path of transformation it becomes older, bigger and in general more complex and it begins to grow at a slow rate. In sum, the life cycle model argue that the firm shows an exponential growth path over time during the first stages – birth and growth; after that, during the maturity and decline phases, the firm starts a new path showing a asymptotic profile, as soon as sales growth slows down. By the third variable, *Venture Capitalist*, we identify those IPOs which rely on venture capital investments (Lester *et al.*, 2006); it is a dummy variable which takes value 1 if at the moment of the IPO there were venture capitalists in the ownership structure of the firm, 0 otherwise.

Secondly, we introduce in our model the education-level variables to investigate the influence of human capital on business performance. Recent studies show how prestige and educational background of CEO and board of directors may impact firm's performance on the markets (Lester *et al.*, 2006) and firm survival (Bates, 1990; Audretsch and Lehmann, 2004). The board of directors has important roles of governance as, for example, the right to choose and advice the management of the firm. Moreover, directors acquire and evaluate information on firm financial situation in order to define firm strategies. Their education and skills may, thus, be an important assets for the firm. Our measures of CEO and Board educational level are *Board Education*, *CEO Business Certificate*, *CEO Graduate*, *CEO Postgraduate* and *CEO Research*. The first is a dummy taking value 1 if there is at least one board director having the bachelor degree, 0 otherwise. The other variables refer specifically to the CEO. They all are dummies taking value 1 if the CEO has respectively a business certificate, a graduate, post-graduate or PhD degree.

As far as learning is concerned, we explore the role of CEO work experiences and capabilities and try to find if they have some impacts on business performance. The literature in the field of knowledge economics shows how the stock of accumulated learning positively influences the development path of firms. For this reason, firms in the early stages of their life cycle, which do not have a past history and experience, may be

supported in their growth by the capability and competence accumulated by the direction in previous experiences. Moreover, the entrepreneurship literature offers theoretical contributions and give empirical foundation to the relationship between propensity to new firm formation and the individual characteristics of entrepreneurs, such as age, level of education, degree of working experience, availability of financial assets, duration of the entrepreneurial status, conditions of switch between ‘wage worker’ and ‘self-employment’ (Evans and Leighton, 1989; Shaver and Scott, 1991; Adaman and Devine, 2002). Entrepreneurs are often associated with creativity and the ability to deal with uncertainty, in the Kirznerian perspective of non-measurable risk associated with new situations. Empirical research offers support for relationships between entrepreneurial attitudes – for example cognitive ability, creativity, intuition – and knowledge and expertise. Barron and Harrington (1981) and Amabile (1988) also show that broad general knowledge, experience in many domains, and overall intelligence levels are positively associated with creativity. However, Stein (1989) finds both positive and negative relationships between creativity and previous experience and learning. Based on previous works (Lester *et al.*, 2006) in our model we, thus, use the variables *CEO Founder* and *CEO Experience*, which are dummy variables respectively denoting whether or not the current CEO is also the firm’s founder, and whether or not the current CEO has already been in other firm boards of directors. To account for the possible impact of learning dynamics and creativity, the age of the CEO has also been used as an independent variable. *CEO 30s*, *CEO 40s*, *CEO 50s* and *CEO 60s* are dichotomous variables represented by a 1 respectively if the CEO age is under 40, between 40 and 50, between 50 and 60, or over 60.

Based on previous research, a number of variables may also influence firms’ post-IPO performances. In our model we control for both exogenous and endogenous factors. Among such control variables, the annual growth rate of the national GDP (*GDP Growth*) is meant to account for likely interactions between the general economic situation and the performance of the individual firm and, thus, to control for exogenous determinants influencing firm’s growth rate. The variable *Investment*, measured as the ratio between capital expenditure (CAPEX) and Total Assets, should control for the part of firm’s growth due to the increase of firm assets. Finally, we use a measure of firm profitability. Actually,

firm sales growth and profitability are two separate aspects of performances and, in general, they should be correlated. However, in some cases this is not true (see Lester *et al.*, 2006). As Miller and Friesen (1984) argue, during the life of a firm, owners other than managers may find necessary to pursue sales growth instead of profit, and they find that this happens mainly in case of major firm organizational changes. Therefore, we control for this effect in the case of an IPO. As a measure of firm profitability in our model the return on investment is calculated as the logarithm of the ratio between EBIT and Total Assets (*LogROI*).

In Table 1 the basic features of dependent and independent variables are summarized.

*Insert Table 1 here*

#### **4. Empirical Results**

The analysis consists of two steps, according to the distinction between time-variant and time-invariant variables. In the first step we applied panel data estimation techniques using the time-variant variables (*Firm Size, GDP Growth, Investments* and *LogROI*). We compared the fixed effect and the random effect models, choosing the former on the basis of the Hausman test. Table 2 shows the results of our analysis.

Two variables out of four are statistically significant. As we expected, the GDP growth rates has a positive coefficient, supporting the idea that firms' performances are influenced by exogenous variables. The correlation between *GDP Growth* and *Firm Growth Rate* support the idea that entrepreneurship can act as catalyst of development as firm rate of growth and high levels of firm performance can, in turn, yield employment gains and contribute to the general economic health of regions and nations. Secondly, and most importantly, the size of the firm proved to positively influence the firm growth rate. This is an interesting result in its own right, as previous research has showed that firm size is inversely related to growth, i.e. smaller firms grow at a greater rate than larger firms. However, previous studies take into account firms along all of the life cycle stages, birth, growth, maturity and decline. Instead, in our study we investigate the performances on a narrower period, involving young and small firms listed on the AIM. Actually, according to

the life-cycle theory, firms' growth path is supposed to follow an S-shaped curve, hence showing an exponential path followed by a logarithmic one. As the AIM is a market dedicated to small firms in the early stages of their growth, firms in our sample are in the first part of the curve, thus characterized by exponential growth rates. This means that in our specific sample, larger firms, which are in the life cycle stage of growth, grow faster than smaller ones, which instead are in the birth phase.

*Insert Table 2 here*

In the second step of the analysis we predicted the individual effects for each firm and eventually regressed them against the three groups of time-invariant variables accounting for risk taking, education and learning. We summarize the result of the OLS estimation in Table 3.

In relation to *risk-taking variables*, as a first result we find a positive and significant ( $p < 0.05$ ) relationship between *Firm Age* and performances. This result is complementary to what we have discussed above, and it also is relevant in the light of the life-cycle literature. We may now reasonably argue that the post-IPO performances of small and young firms listed at the AIM seem to follow the life cycle development path. It is actually well known that higher levels of risk are associated with this kind of firms, and hence they are subject to credit rationing. However, by listing at the AIM firms are able to raise the necessary levels of funds to sustain their growth process along the first part of the S-shaped growth path. From our findings, *Venture Capitalists* is not a significant variable. This result seems to confirm the ambiguous impact of venture capitalists on firm performance, as shown by the literature on this topic.

Secondly, we obtained some interesting findings concerning education-related variables. As far as the CEO is concerned, the educational level proved to be relevant, in that the coefficient on the *CEO Post Graduate* is positive and statistically significant ( $p < 0.05$ ). This means that firms' performances are likely to be positively influenced by the CEO educational attainment. This finding is consistent with the literature on this topic.

For what concern learning-related variables, the *CEO Experience* is as well a positive and statistically significant variable ( $p < 0.1$ ). This clearly provides supporting evidence to the relevance of the accumulation of tacit knowledge through learning processes. Next, the age range having positive and statistically significant ( $p < 0.05$ ) effects on firms' performance, is that under 40. Thus we can maintain, as previous studies argue, that the typical entrepreneurial features like creativity and alertness are more likely to be found among young CEOs. It must be noted that having already been in a board of directors appears to matter more than the age of the CEO in terms of accumulation of knowledge by experience. In conclusion, it would seem that the accumulation of both codified and tacit knowledge is a relevant factor determining the positive performance of the firm.

*Insert Table 3 here*

## **6. Discussion and Policy Implications**

Within the regional science approach the interaction between the firms, institutions and universities have been stressed as conducive to innovation and economic growth. According to Audretsch (1995), entrepreneurship is about change and innovation. In this direction is possible to find a link between the main local actors and the entrepreneurship dimensions behind new businesses performances.

In this work the determinants of business performance are inferred from a broad range of variables (e.g., accounting information, CEO and board age, educational background and past experiences). Our results confirm that intangible assets other than traditional ones (e.g., firm age and size) are important factors shaping the performance of firms listed on the AIM. In particular we found that age and size have positive effects on firms growth, consistently with the life-cycle theory. It also seems that CEO educational level and previous experiences are critical to the businesses performance, providing further support to the importance of codified and tacit knowledge stocks. Moreover, as we know from literature on entrepreneurship, young CEOs appear to give valuable contributions to firms' rate of growth.

The results of this work could have some policy implications both at national and regional level. At the national level, policy makers could take into account the relevance of an efficient financial system, in particular the emerging role of secondary markets such as the AIM, and try to remove financial constraints that hamper the prospect of new businesses. In their start-up and growth phases, firms need substantial external funding. However, the literature on this topic highlights that small and young enterprises are subject to 'credit rationing' and thus have major difficulty in attracting capital in their initial phase, mainly due to information asymmetries (Stiglitz and Weiss, 1981; Fazzari, Hubbard and Petersen, 1988; Winker, 1999). Actually, potential investors have in general little information on the entrepreneurial capabilities or about the investment opportunities of such enterprises. Hence, if lenders are not able to identify the quality or the risk associated with the borrower, there will be credit rationing (Jaffe and Russell, 1976). Under uncertainty conditions a secondary market as the AIM could help in lowering credit rationing. In this way new businesses may find the funds required to finance their growth.

As far as entrepreneurship is concerned, it is important to look at the process of transformation in the cultural and behavioral attitudes of many countries towards entrepreneurship, in particular on the matter of rewarding propensity to risk, an element that brings with it economic advantages. The increase in the number of new firms and their relative chances of survival and growth is, thus, an important objective for governments. At the regional level, political intervention could aim at promoting entrepreneurial activities, which ease the local process of change by encouraging the propensity to risk and easing the access to external capital. Education towards entrepreneurship represents an example of how to stimulate a more dynamic entrepreneurial culture. Firstly, policies could aim to include specific modules and courses on economics and business from compulsory up to graduate school. Secondly, in order to increase the population of entrepreneurs, another appropriate policy would be to foster the participation of young and the unemployed in the entrepreneurial process. Our findings support these two achievable intervention as they show how educated and young CEOs positively influence firms performance.

To conclude, we believe that further researches could extend the results of our analysis. First of all the variables we used to explain firms' performances are just a selection on the wider set of possible independent variables, which may be found in the literature. Moreover, firms' growth rate could be measured also through other indicators, besides firms sales. In this direction in future researches we will introduce some industry-specific variables, further information about the governance and financial data, in order to increase the set of explanatory variables and improve the model. We will also consider additional performance measures like profitability and cash flow variables to check for alternative measures of firms' growth.



## 7. References

- Adaman, F. and P. Devine, 2002, 'A Reconsideration of the Theory of Entrepreneurship: A Participatory Approach', *Review of Political Economy*, 14 (3), 329–355.
- Almus, M. and E.A. Nerlinger, 1999, 'Growth of New Technology-Based Firms: Which Factors Matter?', *Small Business Economics*, 13 (2), 141-154.
- Amabile, T.M., 1988, 'A Model of Creativity and Innovation in Organizations', *Research in Organizational Behavior*, 10, 123–167.
- Audretsch, D.B., 1995, *Innovation and Industry Evolution*, Cambridge, MA: MIT Press.
- Audretsch, D.B. and M. Keilbach, 2004, 'Does Entrepreneurship Capital Matter?', *Entrepreneurship Theory and Practice*, 28, 419–430.
- Audretsch, D.B. and E.E. Lehmann, 2004, "The Effects of Experience, Ownership, and Knowledge on IPO Survival: Empirical Evidence from Germany", Max-Planck-Institut zur Erforschung von Wirtschaftssystemen, *Papers on Entrepreneurship, Growth and Public Policy* (20-2004).
- Barron, F. and D.M. Harrington, 1981, 'Creativity, Intelligence, and Personality', *Annual Review of Psychology*, 32, 439–476.
- Bates, T., 1990, "Entrepreneurial Human Capital Impacts and Small Business Longevity", *The review of Economics and Statistics*, 72, 551-559.
- Cassia, L., M. Fattore and S. Paleari, 2006, *Entrepreneurial Strategy: Emerging Businesses in Declining Industries*, Edward Elgar: Cheltenham.
- Covin, J. G., and T. J. Covin, 1990, "Competitive Aggressiveness, Environmental Context, and Small Firm Performance", *Entrepreneurship Theory and Practice* , 14, 35–50.
- Davidsson, P., B. Kirchoff, A. Hatemi-J and H. Gustavsson, 2002, Empirical analysis of business growth factors using swedish data, *Journal of Small Business management*, 40 (4), 332-349.

Etzkowitz, H. and L. Leydesdorff, 1997, *Universities in the Global Economy: A Triple Helix of University–Industry–Government Relations*, Cassell: London.

Etzkowitz, H. and L. Leydesdorff, 2000, ‘The Dynamics of Innovation: from National Systems and “Mode 2” to a Triple Helix of University–Industry–Government Relations’, *Research Policy*, 29 (2), 109–123.

Evans, D.S. and L.S. Leighton, 1989, ‘Some Empirical Aspects of Entrepreneurship’, *The American Economic Review*, 79 (3), 519–535.

Fazzari, S.M., R.G. Hubbard and B.C. Petersen, 1988, ‘Financing Constraints and Corporate Investment’, *Brookings Papers on Economic Activity*, 88, 141–195.

Freeman, C., 1987, *Technology and Economic Performance: Lessons from Japan*, Pinter: London.

Freeman, C., 1991, Networks of Innovators: A Synthesis of Research Issues, *Research Policy*, 20, 499-514.

Hebert, R.F. and A.N Link, 1989, ‘In Search of the Meaning of Entrepreneurship’, *Small Business Economics*, 1, 39–49.

Jaffe, D.M. and T. Russell, 1976, ‘Imperfect Information, Uncertainty and Credit Rationing’, *Quarterly Journal of Economics*, 90, 651–666.

Lau, T., T. W. Y. Man, and I. Chow, 2004, “Organizational Capabilities and Performance of SMEs in Dynamic and Stable Environments,” *The International Journal of Entrepreneurship and Innovation*,” 5(4), 221–229.

Lester, R.H., S.T. Certo, C.M. Dalton, D.R. Dalton and A.A. Cannella, Jr, 2006, “Initial Public Offering investor valuations: an examination of top management team prestige and environmental uncertainty”, *Journal of Small Business Management*, 44, 1-26.

Lundvall, B., 1992 , *National systems of innovation: towards a theory of innovation and interactive learning* , Frances Pinter: London.

Marshall, A. , 1890, *Principles of Economics*, Macmillan: London.

Nelson, R., 1993, *National innovation systems: a comparative analysis* , Oxford University Press: Oxford.

Miller, D., and P. H. Friesen, 1984, "A Longitudinal Study of the Corporate Life Cycle," *Management Science* 30(10), 1161–1183.

OECD - Organization for Economic Co-operation and Development, 1998, *Fostering Entrepreneurship*, OECD: Paris, 12.

Quinn, R.E. and K. Cameron, 1983, "Organisational Life Cycles and Shifting Criteria of Effectiveness: Some Preliminary Evidence", *Management Science*, 29, 33–51.

Rosemberg, J.J. and G. Saloner, 2000, "Visionaries, Managers, and Strategic Decisions", *Rand Journal of Economics*, 31, 693-716.

Sadler-Smith, E., Y. Hampson, I. Chaston, and B. Badger, 2003, "Managerial Behavior, Entrepreneurial Style, and Small Firm Performance," *Journal of Small Business Management*, 41(1), 47–67.

Saxenian, A.L., 1994, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge, MA: Harvard University Press.

Shaver, K.G. and L.R. Scott, 1991, 'Person, Process, Choice: The Psychology of New Venture Creation', *Entrepreneurship Theory and Practice*, Winter, pp. 23–42.

Stein, B.S., 1989, 'Memory and Creativity', in J.A. Glover, R.R. Ronning and C.R. Reynolds (eds), *Handbook of Creativity*, Plenum Press: New York, pp. 163–176.

Stiglitz, J.E. and A. Weiss, 1981, "Credit Rationing in Markets with Imperfect Information", *The American Economic Review*, 71, 393–410.

Storey, D., 1994, *Understanding the Small Business Sector*, New York: Routledge.

Swierczek, F. W. and T. T. Ha, 2003, "Entrepreneurial Orientation, Uncertainty Avoidance and Firm Performance," *International Journal of Entrepreneurship and Innovation*, 4(1), 46–58.

Winker, P., 1999, "Causes and Effects of Financing Constraints at the Firm Level", *Small Business Economics*, 12, 169–181.

Wolff J. A. and T. L. Pett, 2006, 'Small-Firm Performance: Modeling the Role of Product and Process Improvements', *Journal of Small Business Management*, 44(2), 268–284.

**Table 1. Variables Typology and Their Measurement Methods**

<b>Variable Class</b>	<b>Variable Name</b>	<b>Time Variant*</b>	<b>Description</b>
Dependent variable	<i>Firm Growth Rate</i>	Yes	dLog(Sales)/dt
	<i>Firm Age</i>	No	Firm year foundation
Risk Taking	<i>Firm Size</i>	Yes	Log(Sales)
	<i>Venture Capital</i>	No	Dummy
Education	<i>Board Education</i>	No	Dummy
	<i>CEO No Academic</i>	No	Dummy
	<i>CEO Business Certificate</i>	No	Dummy
	<i>CEO Graduate</i>	No	Dummy
	<i>CEO Post Graduate</i>	No	Dummy
	<i>CEO Research</i>	No	Dummy
Learning	<i>CEO Founder</i>	No	Dummy
	<i>CEO Experience</i>	No	Dummy
	<i>CEO 30s</i>	No	Dummy
	<i>CEO 40s</i>	No	Dummy
	<i>CEO 50s</i>	No	Dummy
	<i>CEO 60s</i>	No	Dummy
Control Variable	<i>GDP Growth</i>	Yes	dLog(GDP)/dt
	<i>Investments</i>	Yes	Log(CAPEX/Total Assets)
	<i>LogROI</i>	Yes	Log(EBIT/Total Assets)

\* Time variant variables are those variables changing over time. Variables that are not time variant are those which are calculated at the time of the IPO.

**Table 2. Results of Estimations with Panel Data techniques**

Dependent Variable = *Firm Growth Rate*

	Fixed Effects	Random Effects
Constant	-22.073 (-1.04)	-5.526*** (-4.18)
<i>GDP Growth</i>	23.817** (2.28)	25.732** (2.36)
<i>Firm Size</i>	.692*** (13.25)	.268*** (8.02)
<i>Investments</i>	.046 (0.91)	.021 (0.48)
<i>LogROI</i>	2.862 (0.52)	.261 (0.87)
R-sq within	0.378	0.350
F / Wald Chi-sq.	46.09***	72.83***
Hausman test		112.89***

Key: \* p<0.1; \*\*p<0.05; \*\*\*p<0.001  
t of Student and z statistics between parentheses

**Table 3. Results of OLS Regression on Firm's Individual Effects**

Dependent variable = $u_i$		
	Constant	-34.932** (-2.24)
Risk Taking	<i>Firm Age</i>	.017** (2.16)
	<i>Venture Capital</i>	-.347 (-1.00)
Education	<i>Board Education</i>	.227 (0.27)
	<i>CEO No Academic</i>	(dropped)
	<i>CEO Business Certificate</i>	-.539 (-0.80)
	<i>CEO Graduate</i>	.489 (1.19)
	<i>CEO Post Graduate</i>	1.217** (2.26)
	<i>CEO Research</i>	.852 (0.187)
Learning	<i>CEO Founder</i>	-.042 (-0.12)
	<i>CEO Experience</i>	.637* (1.89)
	<i>CEO 30s</i>	.930** (2.02)
	<i>CEO 40s</i>	(dropped)
	<i>CEO 50s</i>	.471 (0.94)
	<i>CEO 60s</i>	.597 (1.15)
R-square		0.12
F		1.67*
N		161

Key: \* p<0.1; \*\*p<0.05; \*\*\*p<0.001  
t of Student between parentheses