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Extended summary

Essays on entrepreneurship

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Abstract. The thesis presents three essays on entrepreneurship: the first one analyses the process for setting up new initiatives, investigating the several factors related to entrepreneurship dynamic, the second one focuses on a type of high-tech entrepreneurship, the academic entrepreneurship, investigating in depth the phenomenon of academic spin-offs, while the third essay discusses the present situation and recent dynamics of entrepreneurship education in Italian universities and compare them with the situation of other countries. The most important findings of the first essay are that Italy reports the lowest index of entrepreneurial dynamics in the global ranking and the lowest share of new high-tech firms in a comparison with nine EU countries. In this sense it is important to understand the reasons affecting these worrying results to suggest policy actions fostering entrepreneurship, in particular high-tech entrepreneurship. The endogenous growth theory, adopted in this thesis, shifted the lens to the importance of knowledge in the production process and its potential to create spill-overs. It is important to understand the places where knowledge is generated. The rise of the modern economy has changed the coordination and co-operation between the actors involved in the economy, particularly in relation to diffusing, using and exploiting knowledge. It is increasingly recognized that when a country wants to prosper within the knowledge economy tighter integration of the activities of industry, universities, public research facilities, and government policy is required in the areas of science and technology. Universities play a new role in this process through the activity of knowledge transfer to industry.

Academic spin-offs are the most promise mechanism to foster this activity because they could have positive effect at the local level in terms of creation of high-tech entrepreneurship and employment and in terms of diffusion of technological spill-over at local level. National, regional and local policy makers are increasingly united in recognizing that economic growth is correlated with a favourable entrepreneurial environment and increasingly perceive the stimulation of a culture of entrepreneurship as a major politically-driven task.

Keywords. Entrepreneurial dynamic, academic entrepreneurship, entrepreneurial education.

1 Problem statement and objectives

New firm creation is one of the most important features of modern economic life. The emergence of new ventures is central to economic adaptation and change and one of the major factors associated with employment growth and increases in sector productivity. In addition, hundreds of millions pursue new firm creation as a serious career option. Knowing more about countries with different levels of firm creation, and the context and specific characteristics of those active in firm creation, is of considerable scientific, practical and policy interest (Reynolds, 2010).

Why is it important to focus on the dynamics of new initiatives?

The most significant is that new firms replenish and maintain the population of operating firms. There is considerable evidence that firm creation is associated with a number of other important contributions to the economy. Pioneering studies in economic literature have tended to examine the important role of new firms in job creation (Birch, 1987).

The role of new ventures is the key to the emergence of new production sectors, new technology clusters in a local context where the new initiatives may benefit from the advantages of agglomeration.

Second, the new independent firms are the source of half of all net new job creation; the other half is accounted for by new branches and subsidiaries, reflecting expansion of existing firms (Dejardin & Fritsch, 2011).

Third, recent advances in consolidated longitudinal data sets on US firms has made it possible to estimate the labour productivity of new, existing, and discontinuing businesses. It turns out that new firms have the highest labour productivity and are responsible for a major share of increases in sector productivity. More efficient new firms displace less efficient existing firms (Fritsch & Schroeter, 2010).

Fourth, new and small firms are source of technical and market innovations. One of the more careful efforts to track the source of technical innovation by firm size found that half of new innovations were produced by small firms (Audretsch, 1995).

Moreover, new firm creation is a major mechanism used by immigrants to integrate themselves into the economy and, for many, a major route for status enhancement. It seems particularly popular for well educated, high energy individuals that may see promotions in established work organizations as problematic, such as minorities and women (Reynolds, Carter, Gartner & Greene, 2004).

Last but not least, generally, entrepreneurship is attractive even for brilliant people with high levels of formal education who have difficulty in finding placement in existing organizations.

For all the above mentioned reasons, entrepreneurship is now at the centre of many policy questions related to science and technology, sustainability, poverty, human capital, endogenous resources, employment, regional and comparative advantages. The surge of policy interest in entrepreneurship has, not surprisingly, been accompanied by growing academic research into its dynamics and processes. With respect to policy, research priorities have focused first on understanding (measuring) and second, on creating environments supportive of entrepreneurship.

According to the literature, we can expect a positive relationship between the activation rate of new business initiatives and the overall growth of the economy (Schumpeter, 1943), with reference to both entire countries and to specific geographical areas.

2 Research planning and activities

Over the past decade, the entrepreneurial rate in Italy decreases and the last GEM (Global Entrepreneurship Monitor) Global Report (Bosma, Kelley, Amoros, 2011) shows as Italy presents the lowest rate of total early stage entrepreneurial activities, defined as the prevalence rate of individuals in the working-age population who are actively involved in business start-ups, either in the phase preceding the birth of the firm (nascent entrepreneurs), or the phase spanning 42 months after the birth of the firm (new owner manager of firm). The empirical evidence shows that the local production systems in Italy based on small firms have experienced increasing difficulty in ensuring the competitiveness of their production and the proper placement and remuneration of new recruits, in particular young people with a high level of education.
Several regions in advanced economies have experienced the same stagnation or decline in traditional manufacturing jobs and the changes in the patterns of entrepreneurial activity during the last decades pose a number of questions that satisfy both the objectives of scientific knowledge and the interests of policy makers who wish to implement measures for promoting entrepreneurship.
The main aim of this research study is to provide a better understanding of the process for setting up new initiatives, analysing the several factors related to entrepreneurship dynamic.
From the methodological point of view, the following database are used in the first essay:

- Movimprese for a descriptive analysis of entrepreneurial rates in Italy by year (from 2000 to 2009), province and sector of activity;
- Gem (Global Entrepreneurship Monitor) APS (adult population survey) from 2001 to 2007 to analyse personal, business and environmental factors explaining the rate of nascent entrepreneurs and the business model of new firms.

3 Analysis and discussion of main results

The principal findings show that the entrepreneurial dynamics is very different across countries and to establish a policy to foster entrepreneurship, there is a need to investigate which factors drive the entrepreneurial process.
From a macroeconomic perspective, the ability of a country to support entrepreneurship is determined by conditions linked with context, while at a micro level, the likelihood of a person becoming an entrepreneur is influenced by individual personal traits, that determine the entrepreneur's response to entrepreneurial push or pull factors (loss of employment, discontent at work vs chance or opportunity to pursuit an idea).
I find that gender, age, level of education, social perception of self-employment as a good career choice have an impact on the probability to become nascent entrepreneur but with different significance across countries and across sectors (low tech vs high-tech sectors) in the same countries.
The data shows that in Italy the level of education losses significance if we add to the econometric model the social capital and the importance of social network in the propensity to start a business: the fact that respondent knows another entrepreneur increase the probability to start a new firm.
Another important finding is that very few nascent entrepreneurs start a business in high-tech sectors.

According to the endogenous growth theory (Braunerhjelm, Acs, Audretsch, Carlsson, 2009), for which technological innovation is seen as the most important factor for achieving long-term economic growth, in Italy a change in the composition of production activities is needed, especially in the manufacturing sector, with a move towards productions that have a greater knowledge content (high-tech sectors). In this context, there is a reassessment of the role of research centres and universities in technology transfer activity from these to industry.

For this reason, the second essay is focused on the phenomenon of academic entrepreneurship that could be defined as the direct involvement of academic scientists into the development and commercialization of their research (Djokovic & Souitaris, 2008). The commercialization of scientific and technological knowledge produced within public research institutions such as universities, laboratories, research centres is increasingly considered by policy makers as fuel for developing and sustaining regional economic growth and the most promising ways to transfer research results to the market place is the creation of a new firm: the most promise way is the set-up of academic spin-offs.

The second chapter analyses the experience of Italian spin-offs, from their first introduction in 1999, with specific regard to the following aspects: the early growth and their impact on local economies. After ten years experience of spin-off promotion by universities and local institutions, there is a growing concern about the evaluation of the impact of spin-offs on universities' technology transfer and local economies.

The empirical analysis refers to a sample of 210 Italian spin-offs set up between 2000 and 2006. From a quantitative point of view, measurable through variable as turnover or employment, the impact is rather marginal and this confirms the literature evidence that shows as most academic spin-offs are not gazelles: most of them start small and remain small, reflecting founder aspirations, capabilities, and resource endowments. Several study investigate the possible reasons to explain these: the imbalance of the sponsor team towards technical skills, lack of clarity in the identification of the entrepreneurial figure (Iacobucci, Iacopini, Micozzi, Orsini, 2011) the difficulty of promoters to transform the academic knowledge in management and organizational objectives (Mustar, Clarysse, Wright, 2007), the lack of financial resources (Wright, Lockett, Clarysse, Binks, 2006), etc. Given these quantitative results, there is a need for assessing the effective role played by these firms in an advanced economy. What I want to demonstrate in the second essay is that the impact of spin-offs tends to be local as most spin-offs stay within the same geographical area as the institution from which they originate. To investigate the phenomenon of university spin-offs considering the specific context means to change the focus at local level, where I think that the impact is relevant. Large empirical literature findings support this line of research giving growing importance of knowledge spill-overs from university research to industrial innovation (Krugman, 1991).

To the best of our knowledge, little attention has been paid to evaluate the role of spin-offs on technology transfer activity by universities and to their impact on local systems. To cover this knowledge gap, I develop an analytical framework to evaluate the impact of academic spin-offs on university technology transfer and on regional development.

The empirical analysis is based on a sample of 26 spin-offs created between 2000 and 2010 from Università Politecnica delle Marche, for which balance sheet data and information about governance were examined. The analysis of the ownership and management team, and its change over time, was made through an examination of information provided by Chambers of Commerce.

To develop a set of indicators to measure the impact of academic spin-offs, I chose to adopt a local approach due to the fact that there are several difference in local innovation system and these may depend on the relevance of the three main actors of triple helix model, university, industry and government (Etzkowitz, 2008), in terms of quantitative importance on the regional innovation system; orientation towards R&D and innovation; technology transfer activities by universities; the importance of relations between the three main actors; funds allocated by public institutions to firms and universities, etc. These differences in local system determine the development of spin-offs. The empirical results reaffirm the consolidated literature about the localized nature of knowledge transfer. If knowledge spill over tends to occur only within limited geographic areas, embedding economic activity based on this knowledge within the local context, universities can become important focal points for local economic developments. The chapter analyse also what factors affect the birth and the development of these companies: sectors of activities, geographical localization, ownership structure, the presence of Technology Transfer Office (TTO) or business incubator and the presence of entrepreneurial courses at University.
The last factor is considered particular important because it could play an important role in fostering entrepreneurship, in general, and high-tech entrepreneurship, in particular, due to the lack of managerial and commercial skills of the nascent techno-entrepreneurs. The third chapter discusses the present situation and recent dynamics of entrepreneurship education in Italian universities and compare them with the situation of other countries. This is done with the aim of understanding the factors affecting the presence of entrepreneurship education in higher education institutions and to assess to what extent the number and characteristics of courses matches the demand for entrepreneurial competences in the Italian economy. The explosion of interest for the entrepreneurship field is resulted also in the institution of courses and degrees at undergraduate and graduate level. Courses about entrepreneurship have grown steadily in all the main countries. In this context the Italian situation is rather 'anomalous' as entrepreneurship education at the university level is still at an embryonic stage. The empirical analysis is based on a census of entrepreneurship courses and curricula run by Italian universities. The information collected and analysed refers to the academic year 2009-2010. I also provide a comparison with the situation of the academic year 2003-2004. From the methodological point of view, the survey is mainly based on data and information collected through Internet that seems to be the appropriate source due to the fact that all Italian universities supply information about their curricula and courses through Internet. Compared with the situation observed in USA and in other European countries, entrepreneurship education is Italy is rather 'underdeveloped'. Only a few of Italian universities have courses dedicated to entrepreneurship and none have developed a specific curriculum on this topic. The courses are generally run by external teachers on the basis of temporary contracts rather than by tenured professors and are concentrated within business faculties while very few exist in engineering faculties.
This seems in vivid contrast with the need of Italy to foster new firms formation. In fact, the spread of entrepreneurship courses could contribute to reduce some of the weaknesses of the Italian entrepreneurship model, as highlighted by the results of the empirical analysis carried on in the first two essays: a) new businesses are concentrated in traditional sectors while there are too few start-ups in high-tech sectors; b) academic spin-offs that, by definition, are high-tech firms tend to remain small, rather than pursuing rapid growth for several reasons, one of them is the lack in managerial competences of team of promoters.

4 Conclusions

The most important findings of the first essay are that Italy reports the lowest index of entrepreneurial dynamics in the global ranking of GEM survey and the lowest share of new high-tech firms in a comparison with nine EU countries. Thus, the analysis aims to understand the reasons affecting these evidences to suggest policy actions fostering entrepreneurship, in particular high-tech entrepreneurship. The empirical findings of entrepreneurial dynamics in Italy suggest that the policy actions should encourage the new firms formation safeguarding stable macro-economic conditions, making sure that the necessary physical infrastructure is in place, improving the incentives for self-employment, promoting the commercial exploitation of scientific findings through transparent intellectual property rights and a well-developed market for venture capital, stimulating entrepreneurship education and training, fostering the female entrepreneurship. Although women have significantly increased their participation in business start-up activities in recent years, they still systemically lag behind men regarding business ownership in most parts of the world. In Italy, the female activity rate in North and Centre provinces is more than twice than the major part of South provinces. Female entrepreneurship could be one unexploited source of entrepreneurial energy, due to the fact that the participation of women in entrepreneurial activities could increase the number of nascent entrepreneurs but, most of all, could add variety to the economic process. Developing an entrepreneurial culture should start with developing awareness. Everyone should know the importance of entrepreneurs for society, but the subsequent step is to stimulate a positive attitude towards entrepreneurship and develop entrepreneurial qualities such as risk taking, creativity, initiative and goal setting. An entrepreneurial culture may be reinforced by status perceptions that society confers on entrepreneurs, leading people to think that being an entrepreneur is an attractive pursuit, but, most of all, by introducing entrepreneurial courses in education system.
Concerning the future research directions, despite the widespread interest from scholars and policy-maker in new firms formation, little is known about the spatial dimension of the entrepreneurial process. To focus attention on attributes of the entrepreneur or characteristics of the newly founded firm is not sufficient, due to the fact that it is known that entrepreneurs tend to start their new ventures in the same area in which they reside. In this sense to evaluate entrepreneurship at local level is a necessity. For this reason, the research agenda plans to analyse the entrepreneurship dynamics in Marche Region and extend it to other local contexts, following an holistic approach in which factors affecting the new firms formation are associated to nascent entrepreneur, to the characteristics of the newly founded firm and to the characteristics of local context.

References

[1] Audretsch, D. B. (1995). Firm Profitability, Growth, and Innovation. *Review of Industrial Organization*, *10*(5), 579-588.
[2] Birch, D. L. (1987). *Job creation in America: How our smallest companies put the most people to work* (p. xi). New York: Macmillan, Free Press.
[3] Bosma, N., Kelley, D., & Amoros, J. E. (2011). *Global Entrepreneurship Monitor, 2010 Global Report*.
[4] Braunerhjelm, P., Acs, Z. J., Audretsch, D. B., & Carlsson, B. (2009). The missing link: know-

ledge diffusion and entrepreneurship in endogenous growth. *Small Business Economics*, *34*(2), 105-125.

[5] Dejardin, M., & Fritsch, M. (2011). Entrepreneurial dynamics and regional growth. *Small Business Economics*, *36*, 377-382.

[6] Djokovic, D., & Souitaris, V. (2008). Spinouts from academic institutions: a literature review with suggestions for further research. *The journal of Technology Transfer*, *33*(3), 225-247.

[7] Etzkowitz, H. (2008). *The triple helix: university-industry-government innovation in action*. London: Routledge.

[8] Fritsch, Michael, & Schroeter, A. (2010). Why does the effect of new business formation differ across regions? *Small Business Economics*, *36*(4), 383-400. Springer Netherlands.

[9] Iacobucci, D., Iacopini, A., Micozzi, A., & Orsini, S. (2011). Fostering entrepreneurship in academic spin-offs. *Int. J. Entrepreneurship and small business*, *12*(4), 513-533.

[10] Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, *99*(3), 483-499.

[11] Mustar, P., Clarysse, B., & Wright, M. (2007). University spin-off firms in Europe : What have we learnt from ten years of experience ? *University Business*.

[12] Reynolds, P. D. (2010). New Firm Creation: A Global Assessment of National, Contextual, and Individual Factors. *ReVision*, *6*(5-6), 315-496.

[13] Reynolds, P., Carter, N., Gartner, W., & Greene, P. (2004). The Prevalence of Nascent Entrepreneurs in the United States: Evidence from the Panel Study of Entrepreneurial Dynamics. *Small Business Economics*, *23*(4), 263-284.

[14] Schumpeter, J. A. (1943). *Capitalism, socialism, and democracy* (p. x, 381, [1] p.). London,: G. Allen & Unwin ltd.

[15] Wright, M., Lockett, A., Clarysse, B., & Binks, M. (2006). University spin-out companies and venture capital. *Research Policy*, *35*, 481-501.