ACADEMIC SPIN-OFFS FOR THE LOCAL ECONOMY GROWTH

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Abstract

Some research supports the suggestion that start-ups can represent a driver in job creation, economic growth, innovation and competitiveness. In the Entrepreneurship 2020 Action Plan and in the Action Plan on Building a Capital Market Union (2015), one of the main actions is promoting entrepreneurship, to support financing innovation for start-ups, to develop a capital market able to stimulate new business and their growth. Policy makers support start-ups and the university promote its 3rd mission, technology transfer, with a policy of new businesses, with academic spin-offs (ASOs). Academic spin-offs can produce direct and indirect benefits on local economies, but these companies encounter many difficulties to develop. The difficulties of access to finance and lack of managerial skills are the main constraints of growth identified in literature. In the paper, we describe the results of an empirical research on spin–offs of the University of Pisa, with the purpose to capture both the benefits generated in the local area and their contribution to relation capital of the university, but also their difficulties in growth. We found that academic spin-offs have produced important effects on local economies, especially with new jobs, but they reveal some criticisms of financial management behavior, which hampers their development. In the conclusion, we debate about the role of the Capital market Union actions by promoting "financing for innovation" for the growth of academic spin-offs.

Keywords: Academic Spin-Offs, Technology Transfer, Growth Obstacles, Local Benefits
JEL Classification: G390, I230, O340
DOI: 10.22495/cocv14i2c2p8

1. INTRODUCTION

In recent years, the European policy makers are working to create an integrated capital market in Europe (Action Plan on Building a Capital Market Union, 2015). The main motivation is that, in the light of the recent financial crisis, the limits of the European capital markets have emerged: in fact, it is fragmented and difficult to access by small and medium-sized enterprises, especially for innovative start-ups. The belief in literature is that innovative start-ups play an important role in Europe for both technical innovation and for economic growth (Lawton Smith, 2000; Dahlstrand & Jacobsson, 2003; Clarysse et al., 2005; Mustar et al., 2008; Kennedy and Patton, 2011). One special kind of innovative start up is the academic spin-off (ASO), whose features make it different from the other SMEs. In fact, ASOs are companies based on the university and founded by professors or researchers. Many contributions in literature focused on several aspects of the phenomenon, but the debate about the impact and the importance that ASOs play on the local economy is already lively (Benneworth and Charles, 2005; Vincett, 2010; Iacobucci and Micozzi, 2014). As stated by Benneworth and Charles (2005), ASOs bring to the local economy several direct and indirect benefits. Following what we have just seen, it is clear the importance that these companies hold for regional development, but ASOs encounter many difficulties during first stages of their lives. The main constraints to growth are the access to finance and lack of managerial skills.

According to this consideration, the aim of this paper is to evaluate the profile of a panel of ASOs and their obstacles to create value. This aim was tested through a sample of spin-offs of the University of Pisa. We found that ASOs have difficulties in access to long term finance, financial management and working capital management are neglected (due to the lack of managerial skills in the entrepreneurial team). However, they contribute to regional development generating high-tech jobs, investing in research and development activities and thus promoting technological innovation.

In the next section, the literature review has two perspectives: (1) the importance of academic spin-offs (ASOs) for the development of the regional area; (2) the Capital Market Union and its role in support of start ups' growth. Then, we explain the methodology of an empirical research and we close with the conclusions in which we discuss also some opinions of interviewed practitioners about light and shade of Capital Market Union.

This work is a first step in the overall research, a work in progress.

2. LITERATURE REVIEW

2.1. The role of Academic spin-off in the European Economy

In the last two years, the European Commission developed an economic policy initiative, called "Capital Markets Union" (CMU), to create a more integrated European Capital Market, to support

stability and economic growth. "Entrepreneurship is also the most powerful driver of economic growth in economic history" (EU Commission Vice-President, 2013). In Italy, the 2015 has signed a lively trend of the innovative start-ups, which have grown of the 60% in a year, reaching the mass of 5118, with 21.752 employees (+41%-ICE). European policy makers are promoting entrepreneurship, supporting innovation through start-ups and implementing a capital market able to stimulate new businesses and their growth: Europe needs new businessmen!

According to this strategy, universities promote their 3rd mission, technology transfer, with a policy of academic spin-offs (ASOs). Academic spin-offs are special start-up firms with features that make it different from the other SMEs. As believed by Borges and Filion (2013), there is not a single definition of ASOs, but an academic spin-off is a start-up where the entrepreneurs, during their activities as students, professors or researchers at a university, acquire technological knowledge or develop a new technology that will, in the future, be used with the support of the university´s business incubator (or another mechanism) to develop a product or a business concept that will be explored commercially by a new venture.

ASO is recognized, indeed, as the main driver in job creation, for economic growth, innovation and for the value creation of the economic system (Acs, Arenius, Hay, & Minniti, 2005; Armington & Acs, 2002; Audretsch & Thurik, 2001; Carree, Van Stel, Thurik, & Wenekers, 2002; Davidsson &Wiklund, 2001; Johnson, 2004; Minniti, Bygrave, & Autio, 2006; Storey, 1994).

Over the past 10 years, the interest in these companies has grown considerably from both researchers and policy makers, because of their role for development of scientific knowledge, innovation and regional economic development (Lawton Smith, 2000; Dahlstrand & Jacobsson, 2003; Clarysse et al., 2005; Mustar et al., 2008; Kennedy and Patton, 2011). Academic studies have discussed several aspects of the phenomenon, but less researches has focused on the impact and the importance that ASOs can play on the local economy (Benneworth and Charles, 2005; Vincett, 2010; Iacobucci and Micozzi, 2014).

As stated by Benneworth and Charles (2005), the benefits of academic spin-offs on local economies can be distinguished between direct and indirect benefits (Table 1). Direct benefits are related to the type of firms and could be more significant in successful regions rather than in peripheral ones (Malecki, 1997). Direct benefits are quantifiable in new employment and turnover growth in the area (Etzkowitz, 2001). The ASOs mission is research, so the investments in R&D activities are not only a way to fulfill their mission but also a driver to create value that could be measured through the enterprise value of the ASOs cluster.

Table 1. Benefits of Academic Spin offs on local economy

Direct Benefits	*Indirect Benefits*
• Turnover growth in the area • Job creation • R&D investments • Value creation • Networks	• Promotion of technological progress • Entrepreneurial atmosphere for innovative start ups • New Network for fund rising • Intellectual Capital

Source: Authors' elaboration on Benneworth and Charles (2005)

Academic spin-offs create also indirect benefits for their region. Different from direct benefits, the indirect ones are not quantifiable, but closely connected to their direct benefits (Iacobucci and Micozzi, 2014). The spin-offs bring a technological entrepreneurship able to develop the regional economy (Etzkowitz, 2001). They can promote a regional technology cluster (Di Gregorio and Shane, 2003) and help to create a favorable environment for the birth and growth of new technology start-ups in the same area (Lockett et al., 2003). Entrepreneurs represent an important source of variation in the economic system by introducing new types of goods and services and/or new ways of organizing the production of such (Schumpeter, 1934).

Another indirect benefit is the production of new technological knowledge (Delmar and Wemberg, 2010): spin-offs could represent an important asset for the university. The ASOs may also work with other companies in the region and contribute to infuse the knowledge through partnership, consultancy activities, shared assets, etc.

The creation of new technological knowledge, networks for access to finance (Dahlstrand, 1999) are other important direct effects. However, the ASOs could maintain linkages with the parent institution through incubators or research collaborations (Heydebreck, 2000; Zomer et al., 2010).

Following what we have just discussed, it is clear the importance that these companies hold for regional development, as main assets of intellectual capital of the universities. Many researchers agree that intellectual capital has a significant importance for obtaining competitive advantages and create value (Stewart, 1999; Sudarsanam et al, 2003; Peltoniemi, 2006). Although knowledge management and intellectual capital mainly appeared in the context of private companies, in the last decade there was a growing interest to study these issues on public organizations, such as universities and research centres. This is mainly due to the fact that universities have as main goal the production and the dissemination of knowledge (Sanchez et al, 2006). Ramirez et al., (2013), argued that when referred to a university, the term intellectual capital is used to cover all the institution's non-tangible or non-physical assets, including processes, capacity for innovation, patents. The tacit knowledge of its members and their abilities, talents, skills, the recognition of society, its network of collaborators and contacts, are all elements of the intellectual

capital. One of the main components of a university's intellectual capital is the relational capital. Relation capital is the intangible resources capable of generating value through the university's internal and external relations. This includes its relations with public and private partners, position in (social) networks, the brands, involvement of industry in training activities, collaborations with international research centres, international exchange of students, international recognition of universities, etc. (Leitner, 2004; Ramírez et al., 2007; Cañibano and Sánchez, 2008; Sánchez et al., 2009; Bezhani, 2010; Bodnár et al., 2010).

2.2. Academic spin-off weaknesses and Capital Market Union

However, some scholars have addressed the issues of growth difficulties that the academic spin-offs, and start-ups in general, encounter during the first stages of their life cycle (De Jong et al., 2006). They highlighted some weaknesses of ASOs such as no interest in planning activities (De Jong et al., 2006) and a low capacity for self-criticism of the management and/or the individual project (Colombo et al., 2008; Van Geenhuizen et al. 2009; Galati et al. 2016). In fact, they guide the activities with a logic of improvisation; the new entrepreneurs, often of scientific and technical training, have poor managerial culture, especially in financial planning, avoiding R&D investments. Because of the low-development of "financial culture" they have to survive with modest financial resources (Colombo et al., 2008). They do not consider the strategical and critical role of working capital management, so they live in an unstable financial equilibrium, border line, frequently feeding an insolvent state. They finance their activity with short-time bank debt of more than 75%! As we highlighted before, small and medium-sized unlisted companies could have difficulty obtaining traditional financing through bank long-term loans and they do not have access to capital through the stock markets. Some research has found, in fact, that the innovative new businesses, while being lively and bearers of value to the economic system, has a high mortality, especially in the first years of life, or it survives under limited conditions. High-tech academic spin-offs, especially, tend to remain small for a long time or to grow slowly (Salvador 2006; Clarysse et al. 2011, Galati et al. 2016). The EU states that "about 50% of new businesses fail during their first five years as businesses often lack an appropriate ecosystem that will enable them to grow" (COM(2012) 795 final). The European strategy is to promote new businesses, but also to support their growth and resilience (COM:2012:0795).

To safeguard and enhance the competitiveness of SMEs in the EU economy, the European Commission has already adopted a clear strategy with Small Business Act for Europe (SBA - June 2008) and communication on Long-Term Financing of the European Economy (March 2014).

One of the main objectives of the "Europe 2020 Strategy" (March 2013) is to ensure SMEs have full access to the credit markets and capital in Europe. Capital Markets Union (CMU) aims to expand the range of financing options for the growing business, which include the ASOs.

Although the CMU is an initiative whose goal is structurally to change the capital market in Europe, it aims to achieve certain objectives in the shorter term. The priority for the short term development (up to 2019) is to increase resources for innovation, for innovative start-ups and for non-listed companies. The European Commission explains in the "Action Plan on Building a Capital Markets Union" (2015), how it intends to achieve this:

1. By encouraging venture capital (through tax incentives) and raising equity capital through a reduction of listing costs. Already in the action plan 2015, the European Commission has identified several goals to achieve by 2016 in the *"Financing for innovation, start-ups and non-listed companies"*. Among the first steps, there is just the support of venture capital system through pan-European venture capital fund-of-funds and multi-country funds. In this direction, the revision of EuVECA and EuSEF legislation and the tax incentives for venture capital and business angel are inserted.

2. To overcome information barriers to SMEs investment. According to bank information on declining SMEs credit applications, this step has the aim to map the existing local and national support and advisory capacities across the EU to promote best practices

3. By promoting innovative forms of corporate financing, like crowdfunding, and by developing a coordinated approach to loan origination by funds.

Another goal is to reduce barriers for companies to enter and raise capital on public markets. This objective is possible through a revision of the regulatory barriers to SMEs admission on public markets and SMEs growth markets.

According to the lively debate in literature about the role of start-ups, and ASOs, for university relational capital and for the economic system, the aim of this paper is to analyze and measure the benefits that these kind of firms could produce in the regional area. This is a response to a gap in the literature, which has so far focused only on a descriptive analysis. The study is completed with the discussion on the weaknesses for the growth of the ASOs and as the CMU actions can create opportunities for them.

3. METHODOLOGY

In the previous parts, we have discussed the different positions that scholars have about the benefits that Academic Spin-offs can produce on local economies, especially as a driver of relation capital of the university. Different European universities are starting to manage relational capital and to measure its value (Ramirez et al., 2007; Wen-Min, 2012; Perez et al., 2015; Secundo et al., 2015). The University of Pisa has promoted a research to evaluate the relational capital value[8]; one of the sub research units[9] has to focus on the study of the

[8] Academic Research Project (PRA). The relational capital in the university management, under the responsibility of Prof. Luciano Marchi.

[9] This part of the research project, "ASOs' Value in the relational capital of the university of Pisa", is under the responsibility of the Ada Carlesi and Giovanna Mariani.

Academic spin-offs contribution to relation capital and to evaluate the intangibles value for their growth.

This part of the research project was developed in three steps: 1) sending the questionnaire 1, to draw the profile of the sample and to evaluate part of the direct benefits; 2) analyzing financial documents; 3) sending the questionnaire 2, to measure indirect benefits and intangibles assets (research projects details, human resource details, patents, research awards and scientific networks). In Appendix 1 we describe the variables of the research.

Purpose of the questionnaire 1 is to draw a profile of the companies in the sample and to assess part of the direct benefits arising from their presence on the territory. The questionnaire 1 aims to obtain general information about the company such as the type of activity, number of shareholders and its education, the sales achieved in the last five years, the number of total employees and R&D employees (Appendix 2).

The questionnaire 2, instead, is more specific and it is structured in two parts. One part aims to obtain information about the indirect benefits and the intangible components of the company (such as research projects in progress, the number of patents and awards won, the number of participation in conferences or associations, the number of partnerships with other organizations, the type of training conducted on employees (Appendix 3).

The University of Pisa has acknowledged 30 companies (31th December 2014), of which 17 have started from 2011 (on average 4 spin-offs per year). Of 30 Pisa University spin-offs, 13 answered the questionnaire 1 and provided the requested information. The sample is composed of the well structured spin-offs (whose names are omitted in order to preserve their anonymity), with different characteristics regarding age, industry, type of activity. With the analysis of the balance sheets (2014), the aim was to highlight financial conditions to outline a snapshot of the companies' health. In the previous parts, we discussed about one of the major weaknesses of ASOs, the low development of the financial culture, which could produce a real brake on their development. To define the financial management ability of our sample, we observe some ratios of debts and of working capital management (Table 3).

Especially in period of the credit crunch, it is important to remember that working capital might be an alternative source of finance rather than debt financing. Working capital is an important driver for the health of the company, it is the expression of the ability of the business to meet its commitments in the short term and to achieve its objectives in the medium-long term (Mariani, 2007, 2008). The research team completed the analysis with the questionnaire 2, to capture the indirect effects generated in the local area, the difficulties in growing they met during their first stages of life, but especially to bring out the intangible aspects of the enterprise value. In the academic spin-offs enterprise value estimation, knowledge, research projects, patents, scientific network but especially the quality of the researchers play a strategic role (Mitchell et al., 1988; Coldrick et al., 2005).

4. RESULTS

The findings are explained below in two different sections. In the first one, we focused on the evidence related to the financial management quality of the Pisa University Spin-offs; in the second section, we summarize some conclusions related to the benefits that these firms bring to the regional area, that is composed of Pisa, Livorno, Lucca and Massa Carrara.

The spin-offs in the sample (Table 2) operate in different innovative industries and they have an average age of 3 years at 2014.

Table 2. Overview of the sample characteristics

Spin-off	*Sector*	*Year of birth*
A	R&S Engineering	2007
B	Life	2013
C	Life	2012
D	ICT	2014
E	ICT	2013
F	R&S Engineering	2011
G	Advanced Instruments	2003
H	ICT	2006
I	New Materials	2011
L	Advanced Instruments	2011
M	R&S Engineering	2011
N	R&S Engineering	2009
O	Advanced Instruments	2011

Source: Authors' elaboration

About the financial management quality, we have analyzed some debt and working capital ratios (Table 3). In this context, it is important to stress that because of the start-ups' possibility to elaborate condensed financial statements and the frequent lack of data produce a difficult financial ratio analysis and less expressive. In Table 3, indeed, it is possible note that some information are not available or they present abnormal configuration. To test the effectiveness of the lack on capital resources to invest in R&D and the quality of financial management, we use the leverage ratio "Debt/Equity" and the "coverage of the interest expenses" (Interest expenses/EBIT – Table 3).

Table 3. Pisa University spin-offs data (2014)

Spin-off	*Sector*	*Year of Birth*	*Sales*	*Leverage Ratio* (%)*	*Interest expenses/EBIT (%)*	*Short term debt /Total debt (%)*	*R&D expenses*	*Working Capital** (days)*
A	R&S Engineering	2007	€392.446	189%	27%	92%	€56.550	n.d.
B	Life	2013	€28.150	0%	0%	24%	€30.000	n.d.
C	Life	2012	€27.930	0%	0%	100%	€13.491	n.d.
D	ICT	2014	€37.750	0%	0%	100%	€7.138	n.d.
E	ICT	2013	€0	n.e	n.e.	15%	€10.435	n.d.
F	R&S Engineering	2011	€100.738	0%	0%	100%	€10.000	-35
G	Advanced Instruments	2003	€103.544	54%	n.e.	100%	€11.000	97
H	ICT	2006	€736.647	89%	10%	76%	€409.000	86
I	New Materials	2011	€106.740	235%	24%	11%	€15.000	39
L	Advanced Instruments	2011	€102.508	36%	1%	100%	n.d.	-43
M	R&S Engineering	2011	€83.896	1%	1%	100%	n.d.	n.d.
N	R&S Engineering	2009	€16.639	1%	0%	100%	€3.000	123
O	Advanced Instruments	2011	€576.918	30%	0%	91%	€341.707	79
	Total		*€2.313.906*				*€907.321*	

Source: Authors' elaboration

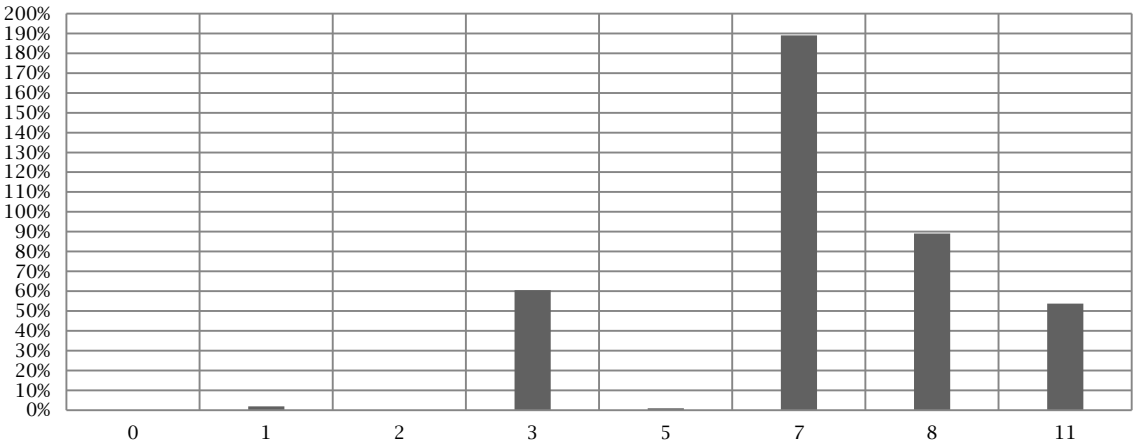
** The data "n.e" expresses the situation in which the company has a negative EBIT while a value of 0% of the Leverage ratio indicates no debt*

*** "n.d." indicates the absence of information, both in the AIDA database that in the financial statements of the company, about the working capital items*

Concerning the leverage, as shown in the Figure 1, under 3 years of life, the spin-offs live debt-free. In this first stage, the financial need is low and it is fed by R&D investments, frequently developed in the university laboratories, freely available for the researchers.

However, after the third year of life, the financial need grows for important investments in R&D, that the well-structured ASOs have to manage in their own laboratories, with companies' researchers. In this situation, the companies begin to finance with bank debts and in the ASOs of the sample, seven years of activity or more, the leverage becomes very high. These innovative ASOs have reached a good level of activities, are more structured, with some first corporate governance traits, they have to finance the upgrading of the existing assets and also enable an effective development.

Figure 1. Representation of the level of Leverage Ratio by age of the firm (2014)



Source: Authors' elaboration

In these companies the financial debt is essential of short term (92%, 100% and 76%), but the "senior ASOs[10]" (in 2014 spin-offs N, A, H, G had more than 5 years) have the opportunity to manage probably preferential financing and, in every case, they are able to contain the economic effects. The Interest expense/Ebit measures the company's ability to service its current debts by comparing its net operating income. In the "senior ASOs", on average, less than 30% of the Ebit is absorbed by the Debt costs, expressing a small derivative risk. We noted some companies with essentially preferential financing without debt costs (spin-offs B, C, D, F, N, O).

According to some studies for SMEs, our data confirm the preference of the ASOs for short-term debt to finance research and development activities. In this situation, the companies realize an Ebit able

[10] As you can see from Table 2, at year of financial data (2014) the spin-off with had less than three years are: D, B, E, C while "senior spin-offs", N, A, H, G have more than 5 years.

to cover the debt costs, which are low for preferential financing. They have, however, to monitor the future Ebit and, in every situation, the general mismatching between the long-term investments in R&D, with uncertain returns, and the short-term liabilities could be the start for financial imbalances for Academic spin-offs.

Also in relation to working capital management, only the "senior companies" express information. In the other companies, especially for the "younger", the more condensed financial statement doesn't give information about the working capital values. This aspect shows that in the early stages of life, companies do not use debt for financing the R&D activities, but at the same time, they do not care about their working capital. In any case, also the companies in which we have information about the working capital, during the interviews for questionnaire 2, the management expresses no strategic interest. As a result, in the ASOs of the sample, a low interest for financial management, mostly due to a poor managerial culture, clearly shows. Against this backdrop, it is so interesting also to mention the information about the managerial skills of the personnel. This shows that only 46% of the spin-offs have given managerial training to the personnel, while 62 % have employees with economic education (Table 4).

Table 4. Representation of Managerial skills variables

Spin-off	*Sector*	*Age*	*Managerial Training* (Yes=1; No=0)*	*Figures with managerial skills** (Yes=1; No=0)*
A	R&S Engineering	2007	0	0
B	Life	2013	1	1
C	Life	2012	1	1
D	ICT	2014	0	1
E	ICT	2013	0	1
F	R&S Engineering	2011	1	1
G	Advanced Instruments	2003	0	0
H	ICT	2006	1	1
I	New Materials	2011	0	0
L	Advanced Instruments	2011	0	0
M	R&S Engineering	2011	1	1
N	R&S Engineering	2009	0	0
O	Advanced Instruments	2011	1	1

Source: Authors' elaboration

** Variable "Managerial training" indicates the spin-offs' promotion of managerial training within the firm. If his value is 1 indicates that firm promote managerial training, if not, assume value 0*

*** Variable "Figures with managerial skills" indicates the presence within the staff of figures with managerial education. If its value is 1, it indicates the presence in the firm of person with Managerial education while 0 indicates their absence*

In relation to the benefits that the spin-offs generated in the local area, in this study we analyze the direct effects. As above mentioned in this study, we focused on the direct and indirect effects generated in the cities of Pisa, Livorno, Lucca and Massa Carrara, due to the aim of the research project. Data are presented, in this case, in an aggregate form, also because the dimension of the direct benefits has significance only if expressed as a cluster. It's possible to draw attention to some important results (Table 5).

Table 5. Direct and Indirect effects on the local area

Direct Benefits	
Sales (2014)	€2.313.906
R&D expenditure (2014)*	€907.321
Job created (from 2010 to 2014)	50 new high-tech jobs
Indirect Benefits (from 2010 to 2014)	
Number of Grants	18
Registered patents	15
Number of projects won	47

Source: Authors' elaboration

** R&D expenditure has a double effect. As expenditure they produces direct benefit, as investment they are assets because fertilize the know-how of these innovative companies and produce a technological development in the regional area*

Related to the innovation of the local area, Pisa University spin-offs spent about 907.321 euros in Research and Development activities. In only 13 ASOs they were able to realize 15 new patents and to win 18 awards for innovation; they have promoted and/or are partners in 47 projects, both Italian and European. Related to employment, spin-offs between 2010 and 2014 have created about 50 new jobs in the regional area. The Pisa University spin-offs generated sales of about 2,313,906 Euro in 2014, fourteen times the value of those in 2010.

5. CONCLUSIONS

In this paper, we have sought to give empirical evidence of the main constraints of academic spin-offs growth and the benefits they bring to their regional area. In these first results of the research, we highlight some important benefits, which our sample of ASOs have been able to generate, only in four years. Our sample represented around the 50% of the Pisa University Spin-offs, on the 31st December 2014, but they are the most active businesses, with entrepreneurs that show more interest and are more collaborative. They have been able to realize some important benefits in term of sales, but especially as drivers of employment, with 50 new jobs, essentially scientists, with an high know-how. As it is seen in some studies (Edvinsson and Malone, 1997; Jacbonsen et al. 2005), the

universities are investing in intellectual capital, where human resource capabilities and innovative capabilities are strategic. In this direction, our ASOs share new innovations, patents and international networks: more specifically, they are fertilizing their expansion option. In respect of the scientific successes, as academic researchers, there is no doubt; for enterprise value there is light and shade. As above mentioned, literature and policy makers drew attention to the criticisms of start-ups, such as a chronic small-scale, with growth difficulties and with high failure rates. They have trouble to promote metamorphosis from researcher to innovative entrepreneur. The companies of our sample are a classical example of this situation. In the first five years, they are struggling to give an important impetus to their activity, but only focused on research. The turnover trend is slow, atypical for innovative industries. More specifically, in our ASOs financial management and planning culture are still missing.

Global Entrepreneurship Monitor underlines this challenge and CMU's first action is to favor an easier access to financing of start-ups for research and their development.

We have to draw attention to the consideration that the success of this CMU aim needs previous concentration on entrepreneurship training, especially on financial management culture. The information asymmetry between SMEs and investors represents an impediment to any new financing instruments diffusion.

Start-ups' focus is on the research, the publication of innovative findings in conferences and reaching an international reputation. They are completely disinterested in problematic management, which they prefer to delegate to external advisors.

Some policy makers and practitioners have highlighted the important role, which CMU could have by promoting "financing for innovation", but they are reflecting on a previous need, pioneering best practices in financial planning stimulation in start-ups management. Start-ups have to remove the chronic "information knots" that characterize the relationship with institutional investors. This also the opinion of some experts[11], who have declared that the first CMU goal should be to train the start-ups to realize a financial planning, especially by managing an adequate financial structure, with less short term bank debts. The R&D investments generate cash flows in the medium long term so start-ups have to finance with long-term funds, of different nature (equity and debt). They have emphasized the CMU position for venture capital and equity financing for the start-ups and foreshadows a cooperation between regional and national development banks. The national development bank should co-finance R&D projects, while the regional bank could have the specialization to support short financial needs. With a lively R&D activity, the ASOs could become a strategic asset in the university intellectual capital.

In this debate, what role could the university system play to increase intellectual capital value? The universities has promoted the 3rd mission, technology transfer, with a policy of new businesses, of academic spin-offs (ASOs), but they have to support innovative scientists to become entrepreneurs, with a managerial skill set to collaborate with financial system and to promote a corporate governance able to compete with international markets.

This work is a first step in the overall research, a work in progress. In the next steps of our study, we have to involve the other 13 ASOs to complete the observation.

The novelty of this study is define better and measure the ASOs benefits on the local area and propose the role of ASOs as asset of intellectual capital of the universities. Lastly, we attempt to discuss the ASO weaknesses and the limit of Capital market Union for this kind of companies.

The definitive aim of the study is, already, to define a model to measure the relational capital. In this direction, could be interesting elaborate case studies to get a better view on intangible assets.

[11] It is an abstract of an interview to some experts of section Capital Markets & Private Equity ABI (Associazione Bancaria Italiana) and Banca d'Italia, promoted by Pirrò Roberto, in his Master Thesis.

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APPENDICES

Appendix 1. The variables of the research

Variable	*Description*	*Source*
Age	Age of the firm.	AIDA
Sales	Total revenues in the fiscal year.	AIDA
Leverage Ratio	(Long Term Debt + Short Term Debt & Current Portion of Long Term Debt)/ Common Equity.	AIDA (if not available, calculated from balance sheet data).
Interest expenses/EBIT	Expresses the company's ability to cover interest expenses with its core business. Interest expenses represent the cost of debt.	AIDA (if not available, calculated from balance sheet data).
Short term debt/Total debt	Expresses the percentage of short term financial debt on total financial debt.	AIDA (if not available, calculated from balance sheet data).
R&D expenses	Total Research and Development expenses in the fiscal year.	Interview.
Working Capital	It is a measure of company's efficiency and its short-term financial health (Working Capital = Current Assets - Current Liabilities)	AIDA (if not available, calculated from balance sheet data).
Managerial Training	Variable that measures the managerial skills in the company through the implementation of management training courses. Takes value 1 if the company has done management training, 0 if not.	Interview
Figures with managerial skills	Variable that measures the presence of managerial figures in the company. Takes value 1 if there are figures with managerial skills, while 0 indicates its absence.	Interview

Source: Authors' elaboration

Appendix 2. Questionnaire 1 (General information about the company)

Person Interviewed Date

Interviewer

1. Activity

2. Year of birth _____

3. ATECO code _____

4. Shareholders:

Name and Surname	Percentage of Shares (%)	Role within company	Education

5. Corporate changes from the year of constitution
   - Yes
   - No

6. If yes, complete the following table:

Year	Kind of change

7. Information about the company

Year	Sales	R&S Expenses	N° of employees	Gross salary	Net salary	Country	R&S employees	R&S employees gross salary

Appendix 3. Questionnaire 2 (Detailed information about companies)

Person Interviewed Date

Interviewer

1. In the last two years your research unit has committed (indicate the change compared to the previous year):

	Unit	Variation	Salary	Variation	Country	Kind of collaboration
Professor						
Researcher						
PhD						
Research fellows						
Technical staff						
Foreign staff						
Other staff						

2. The company has won research projects during the period 2010-2014?
   - Yes
   - No

3. Description

Kind of project	Role in the project	Organization	Year	Country	Loan for the project	Achieved results

4. With the research projects won, did you have the opportunity to buy tools?

	For research	For the trials	For teaching	For other uses
Under 1000 (Euros)				
Between 1001-3000				
Between 3001-5000				
Between 5001-7000				
Between 7001-10000				
Over 10000 (Euros)				

5. Purchases above were made using suppliers located in Region (indicate the city)?
Yes □ No □ City ____

6. If yes, for what percentage of the total amount?_____

7. Partnership with other organizations:

Organization	Country	Year	Kind of collaboration	Results obtained	Profit (Euros)

8. Patents and awards

Award	Patent	Year of filing	Book value of the patent

9. Are you developing new projects?

Period	Kind of project	In collaboration with	Country	Aim	Value of the project	Result of the project

10. Have you promote:

1-New products Yes □ No □
2-Scientific publications Yes □ No □
3-Other (description) _____

11. If did not realized new patents, this is due to:

1 – lack of innovations subjected to patent
2 – technical difficulties
3 – bureaucratic difficulties
4 – Other (specify) _____

12. Have you funded:

Kind	Period	Kind of collaboration	Department	Aim	Amount finances
Scholarships					
PhD Scholarships					
Research grants					
Contracts					
Instrumentation					
Training					
Other (specify)					

13. Have you promote staff training?
Yes □ No □
If yes, what kind? □ Managerial training □ Technical training □ Language training

14. The company participates in associations?
Yes □ No □

If yes, specify the number of associations in which the company participates _____

15. Paper presentation and participation in conferences over the past two years:

Year	Kind of conference	Country	Effects generated on the company

16. There are figures with managerial skills?
Yes □ No □
If yes, describe:

Role covered	Kind of education	Years of experience	Salary