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(Article begins on next page)

Survival drivers of post-incubated start-ups: The effect of academic governance

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ABSTRACT

Innovation one of the most important drivers for the success of entrepreneurial activities at all level. The last decade has shown how innovation and new technologies can dramatically disrupt business models and reshape the competitive scenario. A relevant role about this change has been played by the start-up movement and the increase in organisations and project aimed at supporting the birth and growth of new business. For instance, University incubators play a relevant role in supporting the growth of start-ups by providing knowledge and research, as well as sustaining entrepreneurship by the direct involvement of their scientists. Previous studies pointed out the relevance of the knowledge flows on the overall corporate performance of firms and showed that the entrepreneurial attitude of university scientist is related only to an effective technology transfer and the good commercialization of their research outputs. However, there is a lack of insights about the outcomes provided by Universities' staff members when involved at different levels on the governance and management of incubated start-ups. This paper critically examines the influence played by University linked corporate governance on the performance of a sample of start-up companies graduated from University Incubators. Essentially, our findings address a negative relationship between the presence of University linked governance and the financial performance of the firm even when controlling for other variables such as the industry and the number of registered patents. The study originally contributes to the current governance and entrepreneurship literature by providing useful insights about University start-ups and the way best practices can be carried out to develop successful university-industry relations.

Keywords: university incubator, corporate governance, performance, survival drivers.

JEL Classifications: D20; F21; G32; O12; P30

1. Introduction

Nowadays, Universities and other higher education organisations contribute to Innovation growths and developments by the creation of laboratories and research centres, the establishment of incubators and scientific/technological parks and their involvement in specific consortiums and networks. Such activities should provide effective technology transfers which lead to the production and commercialization of new ideas and science advances. Incubators and scientific parks offer different advantages to start-up firms (i.e. location and offices, laboratories, administrative and logistic services, etc.) and provide, definitely, a good environment for the creation and the development of new ideas.

Usually incubators take care of newly created firms during their early start-up, after usually two-three years such firms are supposed to become more mature and leave the incubation phase. Therefore, given their specific survival and innovation skills, once the incubator has been left, some firms obtain satisfying financial performances while others don't without confirming their initial innovation's assumptions. Although the possible internal and external environmental factors who lead to different financial performance, we would like to focus on the effect played by Universities Faculty members when involved in the governance of such innovative incubated firms.

The remainder of the paper is structured as follows: the second section reviews the literature and leads to the hypothesis development in section three; the fourth section presents the methodology; findings and discussions are presented in the fifth section; the sixth and last section concludes the study and discusses some possible limitations and suggestion for further research.

2. Literature review

Besides the majority of corporate governance studies' focus is on large public companies (Forbes and Milliken, 1999), there is growing number of scholars who investigate small and medium entrepreneurial firms with detailed attention on the role played by innovation factors such as university-industry links, regional contexts and policy making (Huse, 2000; Forbes et al., 2006). However, the current literature on new ventures remains rather fragmented and doesn't point to a dominant paradigm (Siegel, 2006; Siegel et al., 2007; Smith and Bagchi-Sen, 2012; Galán-Muros et al., 2017). Because of its recent development, the related lack of theorisation and the few amount of longitudinal studies mainstream scholarly journals attracted only a minority of articles in this field (Aldrich and Baker, 1997; Rothaermel et al., 2007).

However, Rothaermel et al. (2007) tried to provide an overarching framework to encompass the different pieces making up the literature university entrepreneurship (i.e. about university licensing and patenting, spin-outs, science parks, incubators, technology transfer offices, etc.). According to their study, four major research areas emerged in the field of university entrepreneurship, namely (i) entrepreneurial research university; (ii) productivity of Technology Transfer Offices, (iii) new firm creation; (iv) environmental context including network of innovation. Conflicting options over the university's system mission have been consistently identified across these four streams as a key barrier to university entrepreneurship and require further exploration (Rothaermel et al., 2007).

Because the study presented in this article encompasses the field related to new firm creation (iii) with a specific focus on the effect of academic governance, this section analyses the current literature in this area. This stream is featured by studies focusing on universities' spin-out activities, establishment of incubators and the different internal/external factors influencing new university ventures and their performance. Accordingly, the literature provides relevant knowledge about the best practices of managing start-ups and incubators, the role of networking activities, the impact of innovation management policies and the overall assessment of the involvement of the University system.

From a managerial perspective, different factors have been found to contribute or hinder the success of university new ventures and their incubating activity (Lockett et al., 2005; Mustar et al., 2006), for example, university intellectual property expenditure and related encouragement of equity investments appear to contribute to the success of university spin-outs (Di Gregorio and Shane, 2003; Lockett et al., 2003; Lockett and Wright, 2005; Patzelt and Shepherd, 2009; Soetanto and Jack, 2016; Wann et al., 2017) while the lack of competency in founding teams, the adoption of unrealistic expectations, resource scarcity and cultural issues are impediments to the formation and growth of university ventures (Samsom and Gurdon, 1993; Kinsella and McBrierty, 1997; Rappert et al., 1999; Chiesa and Piccaluga, 2000; Steffensen et al., 2000; Franklin et al., 2001; Schwartz, 2009; Rajamaki, 2011; Cai et al., 2017).

From a network activity perspective, the ties between new university ventures and the business world (i.e. institutions, industry associations, venture capitalists) seem to increase funding rates (Shane and Stuart, 2002; Grandi and Grimaldi, 2003; Johansson et al., 2005; Lofsten and Lindelof, 2005; Hytti and Maki, 2007; Salvador, 2011), a feature that can be leveraged by the quality of the funding teams, the quality of human resources and their individual attitudes in decreasing the probability of failure (Link and Scott, 2005; Lockett and Wright, 2005; O'Shea et al., 2005; Powers and McDougall, 2005; Jain et al., 2009; Clarysse et al., 2011; Horta et al., 2016; Schaeffer and Matt, 2016). Consequently, different findings have been provided about the relationships between new ventures' performances (growth, rate of survival/failure, venture capital funding, Initial Public Offerings) and factors such as universities' policies, faculty members, faculty Technology Transfer Offices, funding teams, investors, networks and other environmental factors.

In such cases, the level of involvement of the University may be called in cause as an important and controversial driver of the start-ups' performance. Whilst most studies found that a high degree of involvement is beneficial for newly created firms (Di Gregorio and Shane, 2003; Degroof and Roberts, 2004; Clarysse et al., 2005; Leitch and Harrison, 2005; Renault, 2006; Anderson et al., 2007; Colombo et al., 2010; Zomer et al., 2010; Mian, 2011; Khodaei et al., 2016) other studies provided evidence about its negative influence resulting in resource dependency, non beneficial reputation effects, lower production of income and delayed graduation from the incubation phase (Cyert and Goodman, 1997; Johansson et al., 2005; Rothaermel and Thursby, 2005b; Litan et al., 2007; Schwartz, 2009; Swamidass and Vulasa, 2009; Friedman and Silberman, 2003; Lasrado et al., 2016).

The debate is still open and these issues need to be studied with the necessary depth, such as exploring how universities should redesign their mandates to effectively manage new firm creation and linkages with external innovation networks (Rothaermel et al., 2007; Grimaldi et al., 2011). Besides, only a few scholars addressed the performance of academic ventures after the graduation from scientific

parks or incubators (Rothaermel et al., 2007; Siegel et al., 2007; Czarnitzki et al., 2014; Jelfs, 2016).

Therefore, the aim of this study is to address if the governance of University Faculty members in the firms' board and their academic status (i.e. full, associate professors, assistant professors and lecturers, technicians, etc.) might influence financial performance (i.e. financial health and profitability) of post-incubated firms, a control for the impact of other variables such as the number of registered patents, the age and the industry of the firm has been included to strengthen the findings.

3. Hypotheses development

Theoretically, the entrepreneurial attitude of the Faculty members involved should lead to effective technology transfer, closer links to research grants, better availability of advanced technology and, overall, continuous and overarching knowledge flow (Renault, 2006; Colombo et al., 2010; Fini et al., 2010; Hayter, 2011). However, university driven firms may achieve negative financial outcomes because of the lack of managerial skills and entrepreneurial experience of the involved Faculty or because of the short available time to spend given their ordinary academic commitments. Moreover, the conflicts between the University and business organisational cultures could depress the performance of academic start-ups (Cyert and Goodman, 1997; Litan et al., 2007). Hülsbeck and Lehmann (2012), while addressing the drivers of having scientist in the board of start-ups, confirmed that such innovative firms usually involve more academics when their survival depend on specific knowhow, however, the stock of knowledge within the University itself is not a determining factor for their involvement in the firm's governance, a need that resulted to be neither related to the age of the firm.

Therefore, in order to contribute to such an interesting scholarly debate, the aim of this study is to analyse the effect of academic governance on the financial outcomes of post incubated New Technology Based Firms, specifically we tested the following directional hypotheses:

H1: Academic governance might have a negative effect on the financial performance of the firm.

H2: Higher is the academic status of the Faculty member eventually involved, lower is the financial performance of the firm.

Our evidence is based on a sample of Italian firms which had grown up in three different University Incubators, we accounted for the effect of different variables by applying a multivariate linear regression model. All the methodology details are presented in the following section.

4. Research methodology

The study has been carried out empirically on a sample of no.71 graduated start-ups, which had left, or had been "graduated", from three important Italian University Incubators, namely the Turin Polytechnic's Incubator (called "I3P" which stands for "Incubatore Imprese Innovative Politecnico"), the Milan Polytechnic's Incubator (called "Acceleratore d'Impresa") and the incubator linked to the University of Bologna (called "AlmaCube").

Although, in the last decade, the Italian incubation activity increased dramatically, we focused on the three above incubators, because they are located in Northern Italy,

which is the most industrialized area of the Country, and because of the experience achieved in their activity since several years as well as their worldwide standing (AIFI, 2001; Catano, 2010)¹.

Incubated firms are usually featured by different maturity and different “graduation year” while, of course, belonging to different industries, therefore, when structuring our sample we decided to consider all the firms that had left the incubators as at the 30th June 2009. This allowed us to have sufficient financial data after their incubation phase.

The incubator with the highest number of graduated firms is the I3P (no. 62 firms) and, although these firms are related to different industries, the majority of them (54%) belongs to the ICT sector. Therefore, because of the difficulties in finding and collecting appropriate data, we decided to consider, within the other two incubators (Milan and Bologna), only those firms related to the ICT industry. Indeed, in our study we controlled for the differences in the industry.

Overall, the maximum annual turnover of the sampled firms is not more than 4.5 million euro and the average number of employees account in the range of 2-10 people.

Because only Italian limited companies have to provide public financial statements, we had to exclude partnership firms. Financial data were collected by requesting financial statements (years 2008, 2009, 2010 and 2011) from the local Chamber of Commerce. Although with some missing years, we were able to collect financial statements related to no. 71 firms.

The complete breakdown, by industry, of the available financial data related to the sample of post-incubated firms is reported in the following table.

Table 1: Nr. of sampled firms, breakdown by industry and available financial statements.

Industry	Available financial statements				Total Sample	
	2008	2009	2010	2011		
Aerospace	1	1	1	1	1	1%
Biotech	1	1	1	1	1	1%
Building & Architecture	1	1	1	1	1	1%
Chemicals & Material	1	1	1	1	1	1%
Electronics & Automation	11	11	11	10	11	15%
Energy	4	4	3	4	4	6%
Environment & Territory	4	4	4	4	4	6%
Information Technology	45	45	45	45	45	63%
Mechanics	3	3	3	3	3	4%
Total	71	71	70	70	71	100%

Because the majority of the firms were incubated by I3P, in order to better understand their governance and the role played by the involved University Faculty staff, we had an in-depth interview with the I3P’s CEO to double check our findings.

The following sub-sections present the specific methodologies according to the different study’s variables.

Financial Performance analysis.

¹ I3P has been awarded by Oxford University as the World Best Science-based incubator in 2004. Moreover, all the three Incubators are active members of PniCube, a leading Italian Incubator association, and of the Gate2Growth network, which is a tool of the EU policies for developing innovative entrepreneurship across Europe.

We analysed the financial performance of the firms by focusing on financial ratios computed on financial structure, leverage and profitability. Usually when firms are not listed in a stock market, financial and profitability ratios can be used as main tools of analysis to assess financial performance (Chakravarthy, 1986; Finer and Holberton, 2002). However, these measures may be biased because of the sample composition, firms operating in different industries featured by specific industry-driven levels of fixed assets, variable/fixed cost ratios and overall competitiveness (Porter, 1980). To overcome these limitations we carried out a comparison with specific industry ratios averages (George et al., 2002), that resulted to don't be significant, because of the peculiarities of New Technology Based Firms, such as their young age, rapid levels of growth, technology development, high levels of start up funds' absorption and different availability of subsidies (Schneider and Veugelers, 2010).

However, in order to overcome the previous limitations and adopt a unique dependent variable accounting for an overall firm's financial performance, we applied the Altman's Z score (Altman, 1968). Z scores are financial ratios essentially used to predict bankruptcy, but they can be adopted as well as valuable index of firms' overall performance.

In detail, because our sampled firms weren't publicly traded on stock markets, we used the Z score formula developed for privately held firms (Altman, 2002), which is:

$$Z = 0.717(X1) + 0.847(X2) + 3.107(X3) + 0.420(X4) + 0.998(X5)$$

where:

X1 = working capital/total assets

X2 = retained earnings/total assets

X3 = earnings before interest and taxes/total assets

X4 = equity book value/total assets

X5 = sales/total assets

Another possible limitation might be that our firms' financial performance is influenced by their lifecycle stages and their ability to be supported by external funding. Usually New Technology businesses became profitable and financially sustainable after some years from their start-up (Rothaermel and Thursby, 2005b), therefore, in our analysis, we controlled for the age of the firm at each financial year of data.

University linked governance analysis.

For our study purpose, University linked governance or 'Academic governance' is defined as the presence of Universities' staff members (i.e. full, associate and assistant professors, lecturers and other scientistis) within the board of directors of one firm as at 30th September 2012. Hence, we excluded all other types of academic link and/or collaboration (i.e. tutors, instructors, scholarship holders, Ph.D. candidates, etc.) who might have been involved within the firm activity.

In order to find out if a post-incubated firm of our sample does involve an academic in its governance, we checked the directors' lists usually attached to financial statements, and we cross-checked with the personnel's lists available on the websites of neighbourhood's academic institutions, such as local Universities and Polytechnics. This information was available for all the firms. We had double-checked the I3P's data (no. 54 firms out of 71) during the interview with its CEO.

In our analysis, a dummy variable (*AG*) is used to address the presence of academic governance in each firm. Another categorical variable (*AStatus*) is used to rank for the

academic status of the University Faculty member involved, specifically, if applicable, a value of 3 is assigned when a full or associate professor presence occurs, a value of 2 is assigned is an assistant professor or a lecturer, and a value of 1 if the board member is a University technician or other administrative staff.

In order to address the influence of academic governance and their status on the financial performance, we conducted multivariate statistical analysis by developing a linear multiple regression model. As such, in order to not break one of the assumptions of linear regression, namely the linear independency of predictors, we included in the model the multiplication of the two principal independent variable, namely *AG* and *AStatus*. Furthermore, we decided to include three control variables related to the nr. of patents registered by the firm, its age and its industry.

The resulting linear regression model is summarised by the following formula.

$$Fperf_i = \beta_0 + \beta_1 AG_i + \beta_2 AStatus_i + \beta_3 Patents_i + \beta_4 Age_i + \beta_5 Ind_i + \varepsilon_i$$

where:

- i* number of each different observation.
- Fperf* dependent variable, the financial performance of one sampled firm related to a particular period, it is equal to the Z score computed on financial statements available data for that period.
- AG* dummy variable accounting for the presence of a University faculty member in the governance of the firm.
- AStatus* categorical variable accounting for academic status of the Faculty member (i.e. full/associate professor, assistant/lecturer, technician/administrative).
- Patents* control variable accounting for the numbers of patents which have been registered in a specific financial year by the firm.
- Age* control variable accounting for the age of the firm in a particular financial year, it's computed as the difference between the year of financial data and the year of establishment of the firm.
- Ind* dummy variable controlling for the influence of industries other than the ICT one, it assumes a value of 1 when the firm doesn't belong to the ICT industry and 0 if it belongs to other industries.

In the following section we present and discuss the findings of the study.

5. Findings and discussion

Our operational sample is composed by 71 New Technology Based Firms graduated from three Universities' Incubator in Italy, specifically, 49 were incubated by I3P Turin (69% of the sample), 10 by Acceleratore d'Impresa in Milan (14%) and 12 by AlmaCube Bologna (17%).

By analysing the involvement of Universities' Faculty members on the firms', we found that no. 22 firms (31% of the sample) have what we define as 'Academic governance' because their board of directors involve at least one Faculty member from a University. The majority of such Faculty, 14 people, has a status of full or associate professor, there are 8 assistant/professor involved in the firms and only a little minority of administrative and technical staff. The complete breakdown of the findings is presented in Table 2.

Table 2 – Number of firms with Academic Governance and related Status of the Faculty involved.

Academic Status	Academic Governance (AG)		TOTAL	%
	Yes	No		
	Associate/Full professor	14		
Assistant professor /Lecturer	6		6	8.4%
Administrative/Technician	2		2	2.8%
Not applicable	-	49	49	69.0%
Total (%)	49 (69.0%)	22 (31.0%)	71	100%

Financial data, were available for the majority of the sample and it covered all the no. 22 firms with academic governance. In order, to provide some quick highlights about the financial performance of the firms, we computed some financial ratios, namely Return On Assets (ROA), Return On Equity (ROE) and Debt/Equity ratio (D/E). Table 4 presents the summary of the computed financial ratios according to the Academic governance feature.

Table 3 – Means of financial ratios computed on available financial data

	Financial Year	Academic Governance (AG)		TOTAL	
		Yes	No	Mean	Std. Deviation
ROA (%)	2008	-1.1%	9.50%	6.3%	22.5
	2009	1.2%	7.10%	6.8%	21.2
	2010	1.9%	11.30%	8.6%	26.3
	2011	1.4%	8.70%	13.2%	27.7
ROE (%)	2008	1.2%	3.40%	2.5%	56.3
	2009	-11.8%	-1.20%	-3.6%	51.2
	2010	6.2%	9.00%	8.6%	52.3
	2011	1.3%	6.40%	4.7%	47.6
D/E	2008	12.7	4.7	8.7	37.3
	2009	4.8	3.5	3.9	5.2
	2010	3.6	3.8	3.8	3.7
	2011	2.9	3.9	3.6	5.2

If we focus on the financial ratios' summary, it seems that firms featured by Academic governance are under performing if compared to the other firms in our sample. On financial year 2009 it is possible to see the impact of the Global Financial Crisis in the profitability and the financial structures of the whole sample of firms. The only significant difference between the two groups (firms featured by academic governance vs. other firms) are the ones related to 2010 and 2011 ROA and ROE ratios. Besides, by looking at the different Faculty member for the firms featured by academic governance, it seems that those involving full and associate professors are under performing in the early years but then overperform in the following years of activity (2011 and 2012). However, the computation of the t-test statistics didn't show any significant differences between the means.

In order to have a more comprehensive financial performance variable, the Altman's Z score was computed over the four years of firms' financial data. Higher is the Z score better is the performance of the firm.

The results confirm our previous findings, the means' values between academic and non academic governed firms seem to be quite different, however significant differences are only found between data from 2008, 2010 and 2011. When analysing for the status of the Faculty member involved in the academic governed firms, although firms featured by full and associate professors were underperforming in the first year of analysis, no actual significant differences were found in the Z score means. Table 6 and 7 present these findings accordingly.

Table 4 – Z scores means values according to the presence of academic governance.

Z Score (<i>Fperf</i>)	Academic governance (<i>AG</i>)		t	Sig.	TOTAL			
	Yes	No			Mean	Std. Deviation	Min	Max
2008	1.663	2.249	2.089	0.041 *	2.017	1.152	-1.232	5.213
2009	1.327	1.928	2.475	0.016 *	1.586	1.146	-1.116	5.385
2010	1.985	2.456	1.575	0.132	2.258	1.715	-2.504	7.932
2011	1.352	2.264	2.338	0.023 **	2.012	1.565	-1.496	6.378

* $p \leq 0.05$, ** $p \leq 0.01$

Table 5 – Z scores means values according to Faculty member status.

Z Score (<i>Fperf</i>)	Faculty Status (<i>AStatus</i>)		t	Sig.	TOTAL			
	Full/Associate Professor	Assistant professor/ Lecturer/ Technician			Mean	Std. Deviation	Min	Max
2008	1.62	1.646	-0.951	0.354	1.663	1.331	0.621	4.261
2009	1.215	1.446	-0.570	0.575	1.327	1.534	0.742	3.421
2010	2.136	1.932	-1.501	0.150	1.985	1.576	1.651	5.090
2011	1.719	0.547	-0.859	0.402	1.352	1.641	1.407	3.430

* $p \leq 0.05$, ** $p \leq 0.01$

Notes: means computed on no. 22 firms featured by academic governance.

Moreover, we controlled for the number of patents that each firm has registered in the year of analysis. Data were available through the Italian Registry of Patents, which has an online database allow to do search queries by knowing the name of the owner (www UIBM.gov.it). Our findings are consistent with previous literature argumentations, firms involving Universities' Faculty staff are more used to register patents (Rothaermel and Thursby, 2005a; Fini et al., 2010; D'Este and Perkmann, 2011; Grimaldi et al., 2011). Data provided in Table 8 shows that firms governed by Faculty members, on average, have registered more patents than other firms, especially at the early stage of their graduation.

Table 6 – Average numbers of registered patents, breakdown by year and academic governance.

Financial Year	Academic Governance (<i>AG</i>)		TOTAL	
	Yes	No	Mean	Std. Deviation

Average Nr. of registered Patents	2008	1.1	0.4	0.61	1.51
	2009	2.9	1	1.65	1.82
	2010	3.3	1.8	2.28	2.13
	2011	4.6	2.6	3.43	2.42

Finally, before conducting the multivariate statistical analysis, we carried out a correlation analysis in order to highlight single variables relationships. The overall descriptive statistics and the resulting correlation matrix are summarised in the following tables.

Table 7 – Main variables study, descriptive statistics.

Main variables - Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	
1. Academic governance (<i>AGov</i>)	282	0	1	0.32	0.23	
2. Academic ranking (<i>AStatus</i>)	88	0	3	2.39	0.46	
3. Patents (<i>Patents</i>)	284	0	6	3.59	1.98	
4. Age (<i>Age</i>)	284	2	6	4.34	0.64	
5. Industry (<i>Ind</i>)	284	0	1	0.73	0.31	
6. ROA	282	-64.55%	188.32%	7.91%	26.15%	
7. ROE	282	-271.20%	121.20%	0.06%	45.12%	
8. D/E	282	-25.0	297.0	4.9	18.81	
9. Z score (<i>Fperf</i>)	282	-2.504	7.932	2.031	1.034	

Table 8 – Correlation matrix (Pearson's correlation coefficients).

VARIABLES	1	2	3	4	5	6	7	8	9
1. Academic governance (<i>AG</i>)	1	.534**	.936**	.035	.404**	-.096	-.055	.098	-.250**
2. Academic ranking (<i>AStatus</i>)	.534**	1	.567*	-.105	.299**	.113	-.029	.051	.221*
3. Patents (<i>Patents</i>)	.936**	.567*	1	.645*	.043	.434*	.232	.545*	.767
4. Age (<i>Age</i>)	.035	-.105	.645*	1	-.243**	.044	.096	.121	.213**
5. Industry (<i>Ind</i>)	.404**	.299**	.043	-.243**	1	-.092	-.104	.080	-.269**
6. ROA	-.096	.113	.434*	.044	-.092	1	.397**	-.021	.637**
7. ROE	-.055	-.029	.232	.096	-.104	.397**	1	-.038	.500**
8. D/E	.098	.051	.545	.121	.080	-.021	-.038	1	-.060
9. Z score (<i>Fperf</i>)	-.250**	.221*	.767	.213**	-.269**	.637**	.500**	-.060	1

* $p \leq 0.05$, ** $p \leq 0.01$

As can be seen from the previous table, the correlation between the financial performance variable (*Fperf*) and the other financial ratios (ROA, ROE, D/E) confirm the usability and the reliability as an overall financial score. The financial performance variable (*Fperf*, computed as the Altman's Z score) is negative correlated with the presence of academic governance in the firms (*AG*), is positive correlated with the Faculty members academic status (*AStatus*), is positive correlated with the age of the firms (*Age*) and negative correlated with the industry variable (*Ind*), which address if the firm belongs to industries different from ICT).

The number of registered patents, which is higher when the firms are featured by academic governance, is confirmed to be an important driver of profitability, according to its significant correlation with ROA. However, firms governed by academics seem to be underperforming when considering the Zscore (*Fperf*) variables, this can be explained by taking into account the financial structure (D/E ratio). Actually, the relevant investments in knowledge and resources which can lead to a patent registration can negatively affect the financial structure by increasing the amount of debt if compared to equity, as it can be explained by the positive correlation between *Patents* and *D/E*. As such, because the Z score it's mainly a financial predictor of bankruptcy accounts negatively for increase in debt, and related assets, over equity (component *X4*, equity/total assets).

Furthermore, to increase the validity of our study, we tested a multiple linear regression model in order to address the combined effects of the different independent variables on the firms' financial performance. In other words, we analysed the overall influence of academic governance, the academic status of the Faculty members involved on the Z score values by controlling for the number of registered patents, the age and the industry of the firms.

The result of the regression analysis is presented in Table 9, which comprises also the expected sign of the relation according to our hypothesis that both academic governance and higher academic status in academia are more likely to have a negative impact on financial performance. Moreover, the number of registered patents is expected to have a positive effect on the overall performance as well as the age of the firm. Although we didn't expect a particular direction for the industry impact on financial performance, it's possible to say that firms not belonging to ICT industry (i.e. biotech, energy, healthcare, etc.) might suffer a different profitability development due to the higher uncertainty of their outcomes. Because the presence of academic governance (*AG*) and the academic status of the Faculty members (*AStatus*) resulted to be significantly correlated, we tested for their combined effect (*AG*AStatus*).

Table 9 – Multiple linear regression results (dependent variable= Financial Performance).

VARIABLES	Predicted sign	β	Std. Error.
Intercept		1.960	0.237
<i>AG</i>	-	-0.351**	0.129
<i>AStatus</i>	-	-0.234	0.212
<i>AG*AStatus</i>	-	-0.413**	0.121
<i>Patents</i>	+	0.323	0.241
<i>Age</i>	+	0.107	0.039
<i>Ind</i>	+/-	-0.559	0.211

R^2	0.242		
Adjusted R^2	0.233		
* $p \leq 0.05$, ** $p \leq 0.01$			

As can be seen by the R^2 value, the overall variance on financial performance explained by the three chosen independent variables is 24.2%. The effect on financial performance of the presence of academic governance is significantly negative ($\beta = -0.351$, significant at $p = 0.01$). This may sound odd, but firms which receive knowledge flows from Universities are related to high risk industries which require high amounts of resources and first need to overcome unexpected difficulties to reach positive cash flows in the short period. Usually, these resources are employed to develop new technologies and advanced knowledge, which contribute to patents' registration. Such investments can be accounted only in part as intangibles assets and are often recognized as research expenses because of the conservativeness of the local accounting principles and, therefore, leading to low financial statements results.

The academic status ($AStatus$) of the Faculty member eventually involved in the governance, doesn't have itself a significant effect on financial performance. However, if we combine its value with the academic governance variable ($AG * AStatus$), we can see that the overall resulting effect on financial performance is significantly negative ($\beta = -0.412$, significant at $p = 0.01$). Control variables increase the overall meaning of the regression model (as it is explained by the absence of significant difference between R^2 and the adjusted R^2), however they don't seem to have a significant effect on the firms' financial performance.

Therefore our two directional hypothesis were fully confirmed. Academic governance has a negative effect on the financial performance of the firms (H1), and higher is the academic status of the Faculty member involved, lower is the financial performance of the firms (H2). Such negative effects can be discussed as follows.

On the one hand, an important role is played by the nature of the business of our firms. Usually, firms involving academic entrepreneurs belong to advanced technologies and risky industries because of the specific knowledge of the involved Faculty and the availability of Universities' resources. Therefore, the performance of such firms is subject to a high rate of uncertainty and becomes eventually more effective quite a long time after the start-up phase. This results in insufficient financial gains which last until the resources invested and the developed researches are finally able to give some effective outcomes in term of innovations and selling products.

On the other hand, the special status of academic people, particularly in the Italian context, could add some additional argumentations to our findings. Quite often, Universities Faculty are allowed to keep one foot in two shoes. In other words, it's quite common that University professors may continue their academic commitments while, in the meantime, acting as shareholders, directors, consultants or advisors of firms. Previous studies pointed out that scientists prefer to maintain university ties to share ongoing research results and gain access to the scientific knowledge pool, while receiving the benefits of dividends payout (George et al., 2002). University scholars are interested in preserving their academic role identity even as they participate in technology transfer (Jain et al., 2009), this particular status may explain the low risk awareness of academic people despite the high uncertainty of the typical business of incubated firms (Renault, 2006). Furthermore, the lack of experience in general management (Wright et al., 2007) and the under development of managerial skills (Vohora et al., 2004) have always been addressed as drivers of low financial

performance. Specifically, this issue becomes more relevant if academics are related to Universities focused on technical subjects, as the case of our sample of firms, where the majority of Faculty members had an engineering background.

If we move our attention to another feature of such academic governance, namely the academic position that Faculty members have in their University, we found significant evidence to prove that higher is the University position (i.e. full or associate professorship), lower is the financial performance of the firm. We expected to find a negative relation because, usually, Faculty with a higher position are charged with a lot of commitments and don't have much time to devote to the management of a firm. Faculty with marginal roles in Universities, like assistant professors or lecturers usually earn lower salaries than full or associate professors, and might be more concerned to achieve positive returns from firms they are eventually involved in, even in the start-up stage. Full or associate professors, although might not be very concerned in the management of the firm, during its start-up stage might facilitate industry relations, access to funding and gaining of grants. Higher role academics, because of their already achieved secure tenure position, might consider to invest in some risky businesses regardless of the initial returns. Therefore, innovations, patents, processes and products developed in riskier businesses might lead to increasing returns for their investors. This might explain the dramatic improvement in 2011's financial performance by the firms involving Faculty with a higher academic status.

In the next sections we conclude the study by highlighting the implications of such findings and by addressing the possible limitations.

6. Conclusions

The study contributes to the considerable debate on the outcomes of effective university–business linkages. Importantly, we focused our analysis on the financial performance of New Technology Based Firms that have grown in Universities' incubators, specifically, when some Faculty members were directly involved on the firms' board of directors.

Previous scholars (George et al., 2002) pointed out some difficulties in addressing the effect of university-business link using different types of business performance. Issues are usually related to the unclearness of the measures used to address an overall financial performance. Indeed, revenue level has been accepted as financial performance metric for more mature firms but it might be not suitable for innovative start-up firms (Rothaermel and Thursby, 2005a). As such, we applied a wider measure of financial performance, namely the Altman's Z score which, although it has been developed to assess the survival skills of a firm, it can be used to reflect an overall performance (Farjoun, 2002).

Indeed, the study of the influence of the Faculty members eventually involved on the financial performance of our sample of post incubated firms provided some interesting results, able to validate our hypotheses. Specifically, our evidence shows that the presence of academic governance has a negative effect on the firms' financial performance and, moreover, higher is the academic status of the Faculty member involved, lower is the financial performance of the firms.

The implications of our findings are relevant and interesting. Given the crucial value of innovation and the role played by start-up firms in today's business, specific attention must be addressed to the effectiveness of University-business links and, importantly, to the role played by the University Faculty eventually involved within their governance. Potential benefits of academic governance could improve firms'

performance only if the involved Faculty act both as ‘knowledge provider’ and ‘strategic supporter’, by becoming really committed in the management and in the business activities. In other words, Faculty members eventually involved in innovative firms should forget about their ordinary commitments (i.e. teaching, supervision, committees, etc.) in order to gain more time for the firms’ managerial and strategic tasks.

Our results shall address the concerns of Universities who aim at creating and disseminating knowledge through a direct involvement in the business’ grow up, because major attention shall be given in stating and issuing appropriate policies with regard to managerial commitments involving internal Faculty members.

7. Limitations and further research

The study is not free from limitations, first of all, the most recent available financial data for companies were those related to the periods 2008-2011, which are financially controversial, as Italy and its firms are still suffering a period of economic downturn. Furthermore, the negative relationship between academic governance and financial performance could have been influenced by the nature of the Faculty members involved. In other words, the majority of the Faculty involved in our sample, is featured by an engineering background and this could justify the lack in management and governance skills.

Indeed, further research might address the generalisability of these findings. The sample used in this study is composed only by Italian firms and related Incubators are linked to Universities with a major focus on engineering and ICT topics, only a minority of firms were involved in other growing and strategic industries like biotech, pharmaceutical, energy, etc.

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