Elements and Effects of the Corporate Governance on the Capital Structure in University Spin-Offs. Evidences from the Italian Context[1]

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Abstract

Scholars remark that the funding gap is one of the most problems for the full development of university spin-offs (USOs). Thus, the choices related to the capital structure of USOs have theoretical and practical implication. The paper aims to study the emerging impact of the corporate governance on the capital structure of USOs. In detail, it was assumed that managerial ownership, board size and independent directors can negatively affect the firm' leverage. Based on a sample of 418 Italian USOs over the period 2010-2014, the findings confirm the hypothesized effects, suggesting the critical role of the corporate governance in the financial issues of USOs. The paper provides new insights, although partial, about the corporate governance and financial dynamics of USOs.

Keywords: university spin-offs; capital structure; corporate governance; firm's leverage; firm ownership; board of directors

1. Introduction

In the last years the arguments related to the creation and development of university spin-offs (USOs) have been raised in the literature of technology transfer (Neves and Franco, 2018; Fini et al, 2017; François and Philippart, 2019) Indeed, USOs, chiefly taking the form of new technology-based firms (NTBFs), are an active tool in inspiring the establishment and development of knowledge-based economies (Brem and Borchardt, 2014; Hagedoorn et al, 2018.). Nevertheless, USOs sharing the characteristics of small new technology-based firms (NTBFs) and other high-growth technology firm (Shane, 2004), thus are essentially affected by several forms of market failures, generally in their early stages (Ayoub et al., 2017; Gantenbein and Engelhardt, 2012). This emerging setting reveal the critical funding concerns in the entrepreneurial development process of USOs (Mustar et al., 2008; Sørheim et al., 2011). Indeed, USOs are likely to denote high growth scenarios, but they may deal with troubles in acquiring fundamental funding for the full expansion of their business (Wright et al., 2006).

In this regard, the parent universities often can finance simply the expenditures related to legal protections of the technology and knowledge generated, in accordance with their intellectual property rule. But, only a small part of parent organizations has sufficient financial resources to funding the spin-off processes involving the young spin-off firm (Ndonzuau et al., 2002). In light of these arguments, the funding gap is obviously one of the most problems for the successful growth of the entrepreneurial actions of USOs (Oakey, 1995; Reitan, 1997).

The choices related to the financial structure assumed by USOs have, thus, theoretical and practical implication (Hoganand and Hutson, 2005; Cassia and Minola, 2011). In this view and in line with the managerial perspective, the modification in the capital structure (Barton and Gordon, 1988) is related, among others, to internal and external dynamics affecting the firm-related risks and control, as we as to the strategic judgments of the management (Brailsford et al., 2002).

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Actually, Shleifer and Vishny (1986), Agrawal and Mandelker (1990) show that the adverse and opportunistic judgements about the company's funding are affected by the ownership structure and the related characters of governance. Hence, with the aim to acquire a clear understanding of a company's financial structure, the characters and the consequences of corporate governance need to be considered. In this regard, it is to note that capital structure affect both structure and choices of the corporate governance (Jensen, 1986; Kochhar and Hitt, 1998). In turn, the corporate governance affects the strategies of the company; among the latter, mainly the configuration choices of the financial structure.

Although the relevance of the above arguments in the literature of reference (Aaboen et al., 2006; Minola and Giorgino, 2011), a deeper and well defined theoretical and empirical study about the influences of mechanisms of the corporate governance on the capital structure of USOs is required. In this view, the paper aims to contribute in filling this literature gap, although partially, investigating whether and how the characteristics of the corporate governance influence the capital structure of USOs in term of firm's leverage. For this purpose, a panel sample of 418 Italian USOs is analyzed for a period of5 years. Italy is one of the main European countries that reveal a rapid growth of the USO phenomenon (Fini et al., 2011; Iacobucci et al., 2015). Indeed, as remarked by the up to date Netval report (2018), at December 31, 2017, there are 1,373 spin-offs in Italy, according to public research, of which 80% have been established over the past ten years.

The remainder of this paper is organized as follows. Section 2 discuss the theoretical framework and advances the research hypothesis. Section 3 describes the sample, the variables used and the analytical approach. Section 4 reports summary statistics and an estimation of the econometric equations defined. Section 5 discusses the results and the conclusions.

2. Theoretical framework and research hypothesis

Literature advances that in the study of the choices at the base of the firm's capital structure the agency theory assumes a critical role (Jensen and Meckling, 1976; Brailsford et al., 2002; Morellec, 2004). In detail, it has been proposed in what way agency costs may affect the capital structure according with the emerging characters of the corporate governance. Based on these arguments, scholars highlight the consequences of an organization's ownership structure on the capital structure. In this regard, the managerial ownership, as a mechanism to decrease agency conflicts by means the alignment of interests among management and owners, is a composite hypothesis with regard the association among managerial ownership and company debt (Hewa Wellalage and Locke, 2015). Indeed, a high number of managers in the ownership of the firms lead to a management entrenchment with tall alignments of interests between managers and owners. This might reduce the positive impact of the agency-related benefits in view of the rise of company debt, generating a non-linear inverted U-shaped association among managerial ownership and debt (Short and Keasey, 1999; Margaritis and Psillaki, 2010). Also, further studies (Berger et al., 1997; Al-Fayoumi and Abuzayed, 2009) highlight how owner managers tend to decrease corporates' debt as of the additional bankruptcy risk.

In contrast with the above statements, only a small part of the literature remarked a positive association between managerial ownership and firm's debt (Mehran, 1992), as well as a mixed result (Kuo et al., 2012). However, in light of the main evidence emerging from the existing literature, the following research hypothesis is advanced:
Hypothesis 1: Managerial ownership has a negative effect on the leverage level of USOs.

Additionally, literature about corporate governance remarked that the composition of the board of directors might have a relevant effect on company' capital structure (O'connell and Cramer, 2010; Kuo et al., 2012). The reason is related to the critical function of the board, which is the central element of the corporate governance structure, forming the safe protecting mechanism of owners' interests from any opportunistic behavior of the management (Dailyet al., 2003). Furthermore, the activities of the board tend to limit the expectations gap emerging between the owners of the firm and the management (Brennan, 2006). Also, the board play an important function both in design judgements and in reaching additional organization performance (Hillman and Dalziel, 2003). On this regard, scholars highlighted a positive link between the size of the board of directors and the capital structure of the firm (Berger et al., 1997; Morellec et al., 2012; Abor, 2007). Three are factors at the base of this relation. First, large boards of directors are characterized by a greater entrenchment that leads to rise of the firm value, in view of the pursuit of a high level of leverage (Berger et al., 1997). Second, a larger board of directors tends to have a negative effect on the corporate governance performance, generating an increase in the level of leverage, in view of the emergent conflicts in decision-making practices (Chen et al., 2012; Yermack, 1996). Third, firms with a larger board of directors might take advantage from an inferior cost of debt due to the optimistic approach of creditors, rising when an efficient control of the firm financial actions emerges (Anderson, et al. 2004).

In contradiction of these arguments, some scholars (Berger et al., 1997; Abor and Biepke, 2006) show a positive association between the size of the board of directors and the capital structure of small and mediums enterprises (SMEs). This evidence highlights that firms with a large board of directors are less apt to use debt, choosing equity, especially in the form of external equity. This is due to the rising pressure of the board on management in decrease the debt ratio, which might in turn lead to an expected rise in the firm value and performance (Abor and Biepke, 2006; Berger, et al. 1997). Consequently, a general mixed association emerges between size of board of directors and capital structure.

However, in view of the fact the main evidences emerging from the existing literature about the topic are mainly focused large firms, and the only study focused on SMEs, for which the USOs share several characteristics (Choi and Lee, 2000; Taheri and van Geenhuizen, 2019)is the one of Abor and Biepke (2006), the following research hypothesis is advance:

Hypothesis 2: A large board size has a negative effect on the leverage level of USOs.

Furthermore, literature advocates that independent directors might have a critical and significant impact on the firm strategy, in view of the fact they might they lead to superior strategic decisions, as well as reduce the emerging uncertainties involving the corporate actions (Pettigrew and McNulty, 1995; Brunninge et al., 2007). Also, these mechanisms increase the capability of the firm to acquire fundamental resources, especially in the form of finance (Pfeffer and Salancick, 2003). Additionally, scholars remark that independent directors might denote a better control on the managerial actions (Kang at al., 2007; Geraldes Alves, 2011), reducing the related agency costs and, therefore, any additional agency issues resulting from the conflict between management and owners (Brickley et al., 1994).

It is to note that relevant evidences about the association between independent directors and capital structure arise from the current literature, although the same are quite mixed. From a first point of view, some studies (Abor and Biekpe, 2005; Abor, 2007) reveal that independent directors generate a positive effect on the debt ratio, although these results are generally not conclusive and required further investigations. However, from a second point of view, other studies (Brennan and McDermott, 2004; Peasnell et al., 2006) show a more strong and negative association between the debt ratio and independent directors. These evidences highlight that independent directors are apt to successfully control the managerial actions and pressure them to decrease the financial leverage, with the purpose to rise the value of the firm and reduce the agency costs. In this regard, the study of Kuo et al. (2012) focused on SME, show that independent directors tend to reduce debt level of the firm. Hence, the following research hypothesis is advance:

Hypothesis 3: Independent directors have a negative effect on the leverage level of USOs.

3. Method

3.1. Sample

With the purpose to empirical validate the research hypothesis defined, data about USOs were collected from Netval database, which is part of the 'Spin-off Italia' project and set up in partnership with Netval, Università Politecnica delle Marche and Scuola Superiore Sant´Anna – Istituto di Management, collecting updated information about the whole population of active spin-offs in Italy (1,385 active firms). From the full dataset of the Netval database, we selected only information about USOs, i.e. 1,275 firms. In view of that Netval database does not cover financial information of the firms, their collection has been obtained by extracting data from Aida BdV database, an Italian subset of the ORBIS database, which contains the historical financial, biographical and merchandise data of about 700,000 active Italian companies. Precisely, financial information is provided by Honyvem that obtains and reprocesses all official accounts deposited at the Italian Chambers of Commerce. From the 1,275 USOs those firms for which the data was not available in the Aida BdV database for the time period taken into account have been eliminated. Therefore, the final panel sample consists of 418 Italian USOs, while data cover the period from 2010 to 2014with a total of 2,090 firm-year observations.

3.2. Variables definitions

3.2.1. Dependent variable

The debt-equity ratio (LEVERAGE) is the dependent variable used in this study, an index of company's financial leverage. Debt-equity ratio is a well-known measure representing one of the key indexes analyzing the capital structure of the firm (Kuo et al., 2012).

3.2.2. Independent variables

With the purpose to analyze the expected impacts of corporate governance on the leverage of USOs, as stated throughout the research hypothesis, three independent variables were used in the regression equations.

First, the managerial ownership was measured by the number of managers having a share in the capital of the firm. (MANAGER OWNER).

Second, in according to Abor and Biepke (2006), the board size was measured by means the number of directors on the board (BOARD SIZE). Third, following Kuo et al. (2012), the independent directors have been measured by means of the number of directors that are neither managers nor shareholders of the company and do not have any contractual affiliations with it, as well as any family affiliations with their owners or managers (INDEPENDENT DIRECTORS).

3.2.3. Control variables

A set of control variables has been used that might have a potential effect on the capital structure of the firm. First, the firm size (FIRM SIZE) has been used measured in term of number of firm's employees. Second, the age of the USOs has been used as a measure of the number years from the date they were founded (FIRM AGE). Third, the profitability level of USOs has been used in term of the Return on Sales index (ROS) measured by dividing the operating profit by the net sales for the period.

3.3. Analytical approach

The investigation of the effects about some key determinants of the corporate governance on the capital structure of USOs was performed according to an empirical approach divided into two stages. In the first stage, descriptive statistics and Pearson bivariate correlation have been computed for the whole sample analyzed; while, in the second stage, three equations have been defined and estimated with linear regression (OLS) to test the research hypothesis. In detail, the defined equations take the following form:

$$LEVERAGE_i = f(\beta_0 + \beta_1(MANAGER\ OWNER_i + \beta_2 FIRM\ SIZE_i + \beta_3 FIRM\ AGE_i + \beta_3 ROS_i + \varepsilon_i) \quad [1]$$

$$LEVERAGE_i = f(\beta_0 + \beta_1(BOARD\ SIZE_i + \beta_2 FIRM\ SIZE_i + \beta_3 FIRM\ AGE_i + \beta_3 ROS_i + \varepsilon_i) \quad [2]$$

$$LEVERAGE_i = f(\beta_0 + \beta_1(INDEPENDENT\ DIRECTORS_i + \beta_2 FIRM\ SIZE_i + \beta_3 FIRM\ AGE_i + \beta_3 ROS_i + \varepsilon_i) \quad [3]$$

where i indexes USO and ε_i is the error term.

4. Results

4.1 Descriptive statistics

Table 1 shows the descriptive statistics of variables used in the study. The findings remark that the USOs sampled show an average of leverage index of 4.63, with a high dispersion in the sample (S.D. = 9.05), underlining that in the USOs investigated, generally, the capital structure is highly imbalanced. Nevertheless, this evidence is largely unequal within the sample, pointing out a strong heterogeneity in the capital structure of the USOs sampled.

Regarding the dynamics related to the corporate governance of USOs, the findings reveal that managerial ownership show a sample-wide mean of almost 2 managers that are shareholder of the USO, with a moderate dispersion of the data in the sample (S.D. = 1.49). This evidence remarks the moderate managerial involvement in the ownership of the USOs. The findings about to the board size show a sample-wide mean of 3.01 directors, with a moderate dispersion in the sample (S. D. = 1.68), revealing a small dimension of board of directors in the sampled USOs. Furthermore, the findings show a medium-low presence of independent directors with a sample-wide mean of 1.016, with a relative low dispersion in the sample (S. D. = 1.26).

About the characteristics of the USOs, the number of employees show a sample-wide mean of 2.13, with a moderate dispersion in the sample (S.D. = 6.69). This evidence remarks the general small size of the USOs studied. Concerning the age of the USOs, the findings show a sample-wide mean of 7.94, revealing that spin-off phenomenon is very recent in the Italian context. However, the sample examined show a medium variance in the age composition of USOs (S.D. =4.01). Lastly, the profitability level reached by the USOs sampled is mostly negative, with a sample-wide mean of ROA of -158.21 and a very high dispersion in the sample (S.D. = 2905.38). This evidence indicates the problems of USOs in reaching successful financial performance, though the heterogeneity of the data in the sample examined is very high.

Table 1 Descriptive Statistics

Variable	*Obs*	*Mean*	*S. D.*	*Min*	*Max*
LEVERAGE	1,811	4.6286	9.0557	0.25	195.4
MANAGER OWNER	2,085	1.9880	1.4288	0	8
BOARD SIZE	2,090	3.0120	1.6812	1	11
INDEPENDENT DIRECTORS	2,085	1.0168	1.2592	0	6
FIRM AGE	2,090	7.9402	4.0098	1	29
FIRM SIZE	2,090	2.1292	6.6887	0	101
ROS	1,710	-158.2077	2905.3770	-73000	160

Table 2 shows the correlation matrix of the variables used for the empirical analysis. The absence of a sufficiently high and significant correlation between the independent variables and control variables included in the defined models allows to exclude problems associated with the negative effects of the nonsense correlation (Aldrich, 1995; Cohen et al., 2013). Hence, multicollinearity was not a critical problem in the empirical analysis.

Table 2 Correlations

		1	2	3	4	5	6	7
1	LEVERAGE	1.0000						
2	MANAGER OWNER	-0.0661*	1.0000					
3	BOARD SIZE	-0.0729*	0.6875*	1.0000				
4	INDEPENDENT DIRECTORS	-0.0221	-0.2146*	0.5567*	1.0000			
5	FIRM AGE	0.0001	-0.0831*	-0.0624*	0.0206	1.0000		
6	FIRM SIZE	0.0462*	-0.0724*	0.0187	0.1109*	0.3533*	1.0000	
7	ROS	0.0098	0.0677*	0.0336	-0.0322	-0.0220	0.0049	1.0000

Notes: *Significant at 5%.

4.1. Models estimation

Table 3 shows the results of the OLS regressions for the three defined equations estimating the impact of the aspects analyzed of the corporate governance on the capital structure of USOs. The regression analyses are performed in a stepwise manner. Model (1) includes all the control variables; models (2), (3), (4) refer to the main effects, entered one by one, while model (5) is the full model. Hypothesis 1 states a negative relationship between the managerial ownership and the leverage level of USOs. From the model (2), the coefficient on managerial ownership is negative and statistically significant (coeff. = -0.400, $p < 0.001$), thus providing support to Hypothesis 1. Hypothesis 2 states a negative relationship between the board size and the leverage level of USOs. From the model (3), the coefficient on board size is negative and statistically significant (coeff. = -0.451, $p < 0.001$), hence, the Hypothesis 2 is supported from the empirical analysis. Finally, Hypothesis 3 states a negative relationship between the independent directors and the leverage level of USOs. From the model (4), the coefficient on independent directors is negative statistically significant (coeff. = -0.282, $p < 0.10$), thus, the sefindings provide support for Hypothesis 3.

Table 3 Estimates of the defined OLS models

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Main effects					
MANAGER OWNER		-0.4000*** (0.1150)			0.1677 (0.4478)
BOARD SIZE			-0.4509*** (0.1377)		-0.6516 (0.4695)
INDEPENDENT DIRECTORS				-0.2824* (0.1459)	0.2378 (0.4314)
Control variables					
FIRM AGE	-0.0337 (0.0470)	-0.0439 (0.0462)	-0.0515 (0.0454)	-0.0348 (0.0469)	-0.0506 (0.0456)
FIRM SIZE	0.0716*** (0.0162)	0.0666*** (0.0165)	0.0763*** (0.0163)	0.0780*** (0.0163)	0.0749*** (0.0164)
ROS	0.0000 (0.0000)	0.0000* (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000* (0.0000)
2011	-1.5506* (0.8062)	-1.5320* (0.8019)	-1.5674* (0.8051)	-1.5729* (0.8107)	-1.5620* (0.8065)
2012	-0.5932 (0.9911)	-0.6061 (0.9896)	-0.6203 (0.9867)	-0.6239 (0.9916)	-0.6305 (0.9884)
2013	-1.2990 (0.8233)	-1.2962 (0.8206)	-1.3270 (0.8235)	-1.3205 (0.8289)	-1.324371 (0.8259)
2014	-1.6803** (0.7892)	-1.6626** (0.7853)	-1.6888** (0.7867)	-1.6976** (0.7926)	-1.6838** (0.7881)
Number of obs	1,710	1,707	1,710	1,707	1,707
R-squared	0.0070	0.0110	0.0141	0.0086	0.0142
Root MSE	8.9567	8.9484	8.9276	8.9593	8.9392
DF	7	8	8	8	10

Notes: Robust standard errors in parenthesis.
* $p < 0.01$.
** $p < 0.05$.
*** $p < 0.001$.

5. Result Discussion and Conclusion

The paper aimed to study the impact of corporate governance on capital structure of USOs. In detail and based on the previous literature, it was advanced that managerial ownership, board size and independent directors have a negative effect on the leverage level of academic ventures. With the purpose to empirical analyze the defined hypotheses, a sample of 418 Italian USOs has been investigated during an exploration period of five years (from 2010 to 2014). The findings show that, in line with the evidence of Al-Fayoumi and Abuzayed (2009), managerial ownership is negatively associated with the USO's leverage. This means that manager that are also shareholders of USOs are more apt to decrease the level of firm's debt in order to reduce the risk of bankruptcy. This evidence seems to confirm a key assumption in literature, that is agency-related benefits decrease with the rising of managerial ownership, both in small firms or in the high-tech sector such as USOs.

Furthermore, the findings of the study show that board size negatively affect the capital structure of USOs. This evidence is in line with the findings of Berget et al. (1997) and Abor and Biepke (2006), highlighting that the greater major pressure of a large board on managers of USOs decrease the firm's leverage, with lead to an improvement in the firm value and long-term financial performance. Finally, in accordance with the empirical results of Wen et al. (2002) and Kuo et al. (2012), the findings show that the existence of independent directors have a negative effect on the capital structure of USOs.

This evidence remarks the effective role of independent directors in monitoring the managerial action and affecting the financing decision of the firm, pressing the management in adopt a lower leverage level to reduce the risk of financial distress.

Nevertheless, the paper is not free of some limitations, which provide new avenues for the future research in the topic. First, even though it is based on the current literature and accepted theories, the findings should be carefully interpreted cause they are drawn from a sample of Italian USOs, which may restrict the generalization of the evidences to other USOs in different context (in particular, if we want to apply the emerging evidences the study to USOs outside the European context). Second, only three variables in the analysis of the effects of corporate governance and capital structure of USOs have been used. Future research in the topic might take advantage from the inclusion in the analysis of additional characteristics of the directors and shareholders, such as those related to their personal and social features, as well as further information related to the ownership structure of the USOs, such as the ownership concentration and the involvement of venture capital and private equity that plays a critical function in the development process of USOs (Rodríguez-Gulías et al., 2018; Bock et al., 2018).

However, the paper provides new insights, although only partial, to the existing literature of USOs and corporate governance, integrating the current knowledge about the emerging impacts of corporate governance on the capital structure in USO, as well as providing some managerial implications for the financing dynamics and corporate governance mechanisms of this type of firms.

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