

## **Listed SMEs and innovation: the role of founding board members\***

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### **Abstract**

Drawing from the resource-based view of the firm, Penrosean theory, and the resource dependence theory, it is argued in this study that the characteristics of directors are key factors for achieving the resources that listed SMEs will require to develop innovation, a scenario that often highlights the necessary replacement of the founding board members. We test our proposed relationships with a sample consisting of all the companies listed on the MAB (Alternative Spanish Stock Market) between 2010 and 2017. Our results offer new insights into the role of the founding board members, highlighting the need for the professionalization of the governance of these SMEs, by appointing independent outside directors and by decreasing the proportion of founding members on the board. Likewise, our results showed that this relationship is moderated by the age of the company.

### **1. Introduction**

In the present, highly turbulent business environment, innovation provides the main competitive advantage for all types of companies (Adams *et al.*, 2006; Duran *et al.*, 2016) and, in particular, for both Small and Medium-Size Enterprises (SMEs) (Gao & Hafsi, 2015; Rammer *et al.*, 2009). At the same time, however, innovation can mean that the company must face certain risks, uncertainties and costs (Balkin *et al.*, 2000) that can hamper this decision. These barriers can be overcome through the skills, resources and networks of board members (Bammens *et al.*, 2011). Thus, the literature has shown that corporate governance affects innovation and R&D (Arzubiaga *et al.*, 2018a; Sapa *et al.*, 2014).

On the other hand, previous research has argued that the presence of the founding members of a firm is key to its success, especially in SMEs (Preisendörfer, Bitz & Bezuidenhout, 2012; El Shoubaki, Laguir & den Besten, 2019) and has provided some insights into founders and innovation (Ortega-Argiles *et al.*, 2005). These investigations have concluded that the founding member's perceptions, education, and previous experience can all affect the innovation levels within the firm (Colombo & Grilli, 2010; Gao & Hafsi, 2015). However, the influence of founding members acting as directors (Block, 2012; Ortega-Argiles *et al.*, 2005) has rarely been addressed in the literature (Wang & Song, 2016). There are two main

arguments that will help to explain the relationship between founding board members and innovation: the resources that founders can continue to contribute to the board at each stage in the life of the firm (Picken, 2017) and the diversity of board composition (Pérez-Calero *et al.*, 2019).

Innovation management within SMEs is peculiar to this group and differs from innovation management in large companies (Tan *et al.*, 2009; Zahra, 2007). Among SMEs, both the scarcity of resources and management shortcomings reflect high heterogeneity with regard to innovation (Arzubiaga *et al.*, 2018a; Rezaei & Ortt, 2018). Similarly, a difficulty over accessing the financial capital market is also a major barrier for innovation within SMEs (Rammer *et al.*, 2009). Therefore, they are obliged to seek different financing options such as the Alternative Investment Market (AIM) (Mallin & Ow-Yong, 1998; Theriou & Chatzoudes, 2013) that offer opportunities to smaller firms to raise new capital (Khurshed, Kostas & Saadouni, 2016; Mallin & Ow-Yong, 1998). However, access to AIMs implies making certain changes within a company, including the role of the owners/founders within the governance of the company (Wang & Song, 2016). In-depth study of the composition of the boards of directors (Garg *et al.*, 2019) in listed SMEs is therefore of interest and, more specifically, the role of the founding board members in this governing body (Wang & Song, 2016).

Thus, the absence of studies that analyze the role as directors of the founders of SMEs (Wang & Song, 2016) and their influence on innovation is remarkable, especially if we take into account that SMEs comprise the largest section of the business community (Parker, 2018; Maldonado-Guzmán *et al.*, 2019). Moreover, SMEs are fundamental for the European economy, because they constitute the highest percentage of businesses in the EU (99%) and have created almost 85% of European employment over the past few years (European Commission, 2019).

Based on the above arguments, the purpose of this investigation is to examine the relationship between the founding board members and innovation in SMEs (Deb & Wiklund; 2017) listed on AIMs; specifically, the convenience of the founder continuing to occupy the position of CEO; and, likewise, the convenience of the founding board members continuing to occupy their seats on the board of directors. Accordingly, drawing on the resource-based view of the firm (Prahalad & Hamel, 1990; Barney, 1991), Penrosean theory (Nason & Wiklund, 2018; Penrose, 1955), and the resource dependence theory (Pfeffer & Salancik, 1978; Hillman *et al.*, 2009), we will explore the following research questions. What role should the founders of SMEs listed on AIMs adopt? How does their presence affect the governance bodies, in relation to the development of innovative strategies? We will then incorporate the age of the company in the main relationships, arguing that the youngest need more support from independent outside directors; while the participation of founding board members is more helpful within more

established SMEs. The contribution of our paper is within this area. Along these lines, both Gedajlovic *et al.*, (2004) and Zahra & Filatotchev (2004) pointed out, from different theoretical perspectives, that founder-managed firms often fail at a relatively young age, and among those that do survive, many stagnate and their resources are unable to support their growth options.

We argue in this study that the characteristics of directors are key factors for achieving the resources that listed SMEs will require to develop innovation (Sciascia *et al.*, 2013; Wincent *et al.*, 2010), highlighting the advantageous alternative of replacing the founding members of the board. The resource-based view recognizes that directors can be a valuable source of competitive advantage, due to their professional and personal qualifications and networks (Gabrielson & Huse, 2005). The resource dependence perspective argues that external links with the business environment of the directors open up access to essential resources (Pfeffer & Salancik, 1978; Hillman *et al.*, 2009) such as financing, technology, information, and know-how that all facilitate innovation. However, not every type of director is of the same value to a company (Shi, Xu & Zhang, 2018), just as each stage in the life of a company may call for different knowledge, characteristics and connection networks (Jain & Tabak, 2008). Thus, an SME that is successfully listed on the AIM will begin a new stage in its trajectory and will require resources that will differ from its previous stages (Cusmano & Thompson, 2013). Penrosean theory (Nason & Wiklund, 2018) argues that a resource is versatile when it offers a wide range of possible use alternatives and has the necessary flexibility to adapt to environmental conditions. These insights provide valid arguments to affirm that the founding members of SMEs are often less versatile and may not possess the requisite skills or experience to deal with the increasing complexity of an SME (Ahmad, Halim & Zainal, 2010) seeking to access financial markets through an AIM listing. It is therefore advisable to replace the founders with independent outside directors within this management body.

We test the proposed relationships in a sample consisting of all the companies listed on the MAB (Alternative Spanish Stock Market) between 2010 and 2017, which permits us to make a number of contributions to the literature.

First, the study contributes to research on innovation within SMEs (Shapiro *et al.*, 2015; Sciascia *et al.*, 2015) listed on the AIM, underlining their characteristics and highlighting their differences in terms of the role of founding members on the board of directors. Second, this study also brings new insights to the corporate governance literature, highlighting the active role played by the board of directors (Forbes & Milliken, 1999) in SMEs. The board not only actively participates in decision-making, according to the contributions of the resource-based dependence perspective, but it also helps to overcome barriers to innovation by providing access to skills, experience, and networks (Bammens *et al.*, 2011). However, the

value of a director will depend on an inherent capability to adapt to the different conditions of the business environment (Nason & Wiklund, 2018). In this sense, directors must be versatile enough to contribute to innovation development. Our work highlights the importance of board composition in the development of the company (Garg *et al.*, 2019) through innovation, describing scenarios in which the replacement of the founders as company directors is a necessary prerequisite for innovation development. Third, this study provides new insights into SMEs listed on an AIM that appoint independent outside directors (Filatotchev *et al.*, 2006a) and that decrease the proportion of founding members on the board. Our study combines (Filatotchev *et al.*, 2006a) the arguments of Gedajlovic *et al.* (2004), Zahra & Filatotchev (2004) and Nason and Wiklund (2018) in relation to the importance to SMEs of a listing on the AIM, not only of their directors' knowledge, but also of the characteristics of their governance structure.

## **2. Theory and hypotheses**

In recent decades, both the turbulence and the competitiveness of the business environment (Wincent *et al.*, 2010) has complicated the decision of an SME to innovate (Narula, 2004; Rammer *et al.*, 2009), even though innovations are viewed as an essential factor for growth and development (Añón-Higo *et al.*, 2014; Maldonado-Guzmán *et al.*, 2019). Hence, SMEs need to enter markets where they can obtain the resources that are vital for their development, such as AIM listings (Colombelli, 2010). To do so, SMEs require the establishment of an effective governance system that can negotiate new challenges (Palacín-Sánchez *et al.*, 2019). If a firm wishes to expand, it must change its governance system (Filatotchev *et al.*, 2006a). In short, an SME that is listed begins a new stage in its life (Cusmano & Thompson, 2013).

There is a difference in the corporate governance structures of large and small companies (Deb & Wiklund, 2017). These structure affect the ways in which individuals are able to integrate their human and physical resources with the firm and the way in which these individuals take their investment decisions (Garg *et al.*, 2019; Belloc, 2014). Therefore, our research focuses on studying the relationship between the presence of founding members on the board of directors and innovation in the context of the listed SMEs. Specifically, the role of the founder as the company CEO and the presence of founding members on the board in this new stage of the life of the SME will be examined. There is considerable evidence that corporate governance affects innovation and R&D (Arzubiaga *et al.*, 2018a; Sapa *et al.*, 2014) (see Table 1). However, there is very little evidence in the context of SMEs (Gao & Hafsi, 2015;

Sciascia *et al.*, 2015). Likewise, the role of the founding board members and their relationship with innovation and R&D has scarcely been studied (Ortega-Argiles *et al.*, 2005).

The resource dependence perspective argues that directors provide access to essential resources through their connections with the external business environment (Pfeffer & Salancik, 1978; Hillman *et al.*, 2009). This perspective suggests that directors influence innovation by providing two critical resources for the firm in its search for ideas and external support for R&D: i) they bring specific knowledge; and, ii) they span boundaries and bring external opportunities to the firm through these linkages.

The resource-based view of the firm (Prahalad & Hamel, 1990; Barney, 1991) argues that the board of directors may be considered as a bundle of strategic resources (Bommaraju *et al.*, 2019) to be used both by and for the SMEs, as they can advise on areas where the company's knowledge is limited or almost non-existent. There is recognition within this theoretical perspective that the board, thanks to the knowledge and personal relationships of its directors, can be a very valuable resource for the firm (Gabrielson & Huse, 2005) to innovate.

Both theoretical perspectives argue for the richness of the resources provided by the directors to innovate. However, in line with entrepreneurship scholars (Beckman *et al.*, 2007) and life cycle theory (Jain & Taback, 2008), the resources that the company needs from the board change as it enters a new phase of its life, such as an AIM listing. Assuming that the firm will evolve into a new phase, management capabilities must change with the shift in focus from viability and survival to the challenges associated with more complex organizational systems (Boeker & Karichalil, 2002). The new stage requires specific skills, knowledge, experience, and networks that are fundamentally different from those required during the founding phase (Jain & Tabak, 2008; Beckman *et al.*, 2007). For this reason, both the knowledge and the experience of the founding members of the board, in this new stage in which the SME is listed on the AIM, are less valuable for the functional operation of the board and less versatile at adapting to the new conditions of the business environment. Accordingly, Penrosean theory (Nason & Wiklund, 2018) proposes that less or even non-versatile resources can only be used for specific initiatives. Non-versatile resources lose value over time, because they are not easily reconfigured or put to new use.

On the other hand, R&D can be considered as a good proxy for innovation, because innovation requires R&D expenditure (Rammer *et al.*, 2009; Chen & Hsu, 2009). A high investment in R&D favours the accumulation of capacities that encourage innovation (Tsai & Wang, 2004). Greater innovation and therefore R&D investment have been shown to emerge from those boards of directors that continually study different proposals within those areas (Dalziel *et al.*, 2011; Ojok & Okema, 2016). One answer to

the puzzle of why firms differ in their R&D investment intensity therefore lies in how they balance the effect of board composition on R&D investment intensity (Kor, 2006).

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### **Founder-CEO and R&D intensity**

CEOs can influence firm innovation in a number of ways (Kammerlander *et al.*, 2015; Simsek *et al.*, 2010; Duran *et al.*, 2016): they shape the resource allocation process; they guide innovation projects; and drive innovative culture. In SMEs, the role of the CEO is even more important (Hsu, Chen & Cheng, 2013), especially when top managers lack the necessary knowledge. These firms therefore depend more upon the resources and the skills of the CEO to make strategic decisions (Herrman & Datta, 2005; Lubatkin *et al.*, 2006; Tihanyi *et al.*, 2000; Saeed & Ziaulhaq, 2019) such as innovation. Besides, their influence will differ, depending on whether or not the CEO is also the founder of the company ('founder CEO'). Unlike large firms where the CEO has to collaborate with the TMT to make and to implement decisions, the hierarchized structure is weaker in SMEs (Lubatkin *et al.*, 2006), therefore a founder CEO will have even more control over innovation decisions. There are a number of arguments to suggest that the skills and capabilities of the founder CEO make it easier for a firm to achieve superior performance, although it all depends on both the stage and the level of organizational complexity of the company at any one time (Jain & Tabak, 2008). Foremost among these is that they value their contribution to the reputation of the company and they tend to develop their businesses within the sectors where they already have experience, which may give an advantage to founder-managed firms (Jayaraman *et al.*, 2000). Founder CEOs have experience in both entrepreneurship and innovation (Colombelli, 2010), as well as a network of contacts built up throughout their career, through which they can access and transfer resources and knowledge (Cao *et al.*, 2015), both inside and outside the company. However, Penrose's theory points out that these resources, which are so valuable for the company at certain stages of its life, may cease to be so when faced with new situations (Nason & Wiklund, 2018) that require resources other than those of the previous stages (Jain & Tabak, 2008; Cusmano & Thompson, 2013).

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Insert Figure 1 here

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The influence of the founder CEO in the future of the firm has mainly been studied in the field of family businesses (Cannella *et al.*, 2015; Miller *et al.*, 2011), generating an interesting debate over the suitability of retaining this figure or giving way to succession (Hearn & Filatotchev, 2019). In this context,

Duran *et al.* (2016) argued that firms with a founder CEO have higher innovation inputs than those without a founder CEO. The reason is because founder CEOs are less sensitive to risk and uncertainty (Caliendo *et al.*, 2009) and because the goals of the founder CEO are aligned with a strong desire for firm growth (Miller *et al.*, 2011). Innovation is one of the most promising ways to grow and the founder CEO must therefore be committed to innovation. In other words, the founder can use personal capabilities to obtain critical resources for the company (Randøy & Goel, 2003).

In the case of SMEs, we can find two lines of research that reflect opposite views: the first argues that founder CEOs have higher intrinsic motivation, greater firm-specific expertise and stronger organizational identification and commitment to the firm (Deb & Wiklund, 2017), which will promote R&D. The founder CEO also brings greater external legitimacy to the organization and invests greater time, energy and resources to ensure its survival (Fischer & Pollock, 2004). In the context of emerging economies, the founder's resources are even more valuable (Hearn & Filatotchev, 2019).

The second line of argument, following the theoretical ideas of Penrose, is that at a certain point in the evolution of a company (Filatotchev *et al.*, 2006a), founder CEOs may not possess the requisite skills or experience to deal with the increasing levels of complexity of the firm (Beckman *et al.*, 2007; Wang & Song, 2016) and will display a tendency towards entrenchment and even over-optimistic attitudes (Schuster *et al.*, 2018). Founder CEOs have biased beliefs that lead them to overestimate their own odds of success (Lee *et al.*, 2020). The literature on entrepreneurial overconfidence has suggested that overconfidence is particularly prevalent among company founders (Dushnitsky, 2010). Although founders understand that most ventures fail, their bias towards overconfidence instils a belief that the odds of failure can, in their companies, be reversed (Hayward *et al.*, 2006). Such overconfidence can both limit their attention to their surroundings and reduce their networking ties, resulting in redundant information (Burt, 1992). This convergence of points of view inhibits the possibility of discovering new opportunities (Smith and Cao, 2007) and makes innovation difficult for the company (Cao *et al.*, 2015). According to the Resource dependence theory and the Resource-based view of the firm, these connections are considered important for accessing and transferring knowledge and resources within and between firms (Cao, Maruping and Takeuchi, 2006; Collins and Clark, 2003; McDonald, Khanna and Westphal, 2008), as well as for reducing both the complexity and the ambiguity of the business environment (Cao *et al.* 2015; Peng and Luo, 2000).

As SMEs evolve in their development, managerial styles and capabilities must change (Filatotchev *et al.*, 2006b; Jain & Tabak, 2008). Specifically, in the growth stage, when the CEO is not a founder, the positive effects of the board's human capital increase and the negative effects derived from

the coordination costs of the group decrease (Tzabbar & Margolis, 2017). On the other hand, the board's network of contacts is based on individuals with whom it shares mental schemas and cognitive similarities (Simsek *et al.*, 2003), which inhibit the possibility of considering new alternatives, hindering innovation. According to Penrose's theory, managing a firm during the different stages of its life requires versatile resources (Nason & Wiklund, 2018). In the stage following the capture of external resources, it will need a CEO equipped with very different sets of skills, knowledge, and connections other than those required in the previous phase (Jain & Tabak, 2008). In this context, continued involvement of the founder in managerial activities becomes less valuable, and is possibly even detrimental to success (Jayaraman *et al.*, 2000).

Following this second line of research and in relation to a listed SME, we argue that the founder CEO will often be both a less versatile and a less valuable resource, because of a lack of knowledge and skills that are necessary for this new stage in the life of the company. Furthermore, the connections and networks of the founder CEO for the attraction of new resources are likely to be more stagnant, which leads to the following hypothesis:

*H<sub>1</sub>: The presence of the founder CEO in listed SMEs has a negative effect on R&D intensity*

### **Founding members of the board and R&D intensity**

The board of directors can play an important role in innovation decisions (Berraies & Ben Rejeb, 2019), depending on the capabilities and the skills of its directors (Bravo & Reguera-Alvarado, 2017). Nevertheless, the influence of the founding members (Block, 2012; Nelson, 2003; Ortega-Argiles *et al.*, 2005) with a continued presence on the board has rarely been addressed in the literature (Wang & Song, 2016), particularly in the case of SMEs listed on the AIM. Previous studies on SMEs have focused on the variables of the human and social capital of the founders/owners of the company, concluding that their perceptions, education, and previous experience can all affect the intensity of R&D investment (Colombo & Grilli, 2010; Gao & Hafsi, 2015).

There are two main arguments that will help to explain the relationship between the presence of founding members on the board and R&D: the resources that founders can continue to contribute to the board at each stage in the life of the firm (Picken, 2017) and the diversity of the composition of the board (Pérez-Calero *et al.*, 2019).

There are various resources that the founders can attract in their role as boardroom directors, in order to boost R&D spending, including human, social, and financial capital (Wasserman, 2017; Barringer *et al.*, 2005; Colombo & Grilli, 2010). The founders are also the source of at least some of the



initial equity capital of their firm, typically providing labour and technical expertise, and holding the decision rights afforded to top managers (Gedajlovic *et al.*, 2004). From the resource dependence perspective, they reduce organizational uncertainty (Pfeffer & Sakancik, 1978). On the other hand, according to the resource-based view, the founding members must have a rationale or logic in mind for taking decisions, given their deep knowledge of the firm (Bommaraju *et al.*, 2019). Thus, the founding members of the board will have developed some understanding of enterprise opportunities that will lead to actions such as R&D investment. Nevertheless, the presence of founding members on the board can have contradictory results, because their capabilities, knowledge, network contacts (Hillman *et al.*, 2009) for new stages in the life of the company, are less valuable (Barney, 1991) and less versatile (Nason & Wiklund, 2018). Thus, the skills required to lead a growing firm within a competitive business environment are very different from those that were initially required to launch the firm. A different mix of skills and experience is required for new phases, with increased emphasis on operations managements, sales, and marketing (Picken, 2017).

Regarding the diversity of the board composition, there are two critical elements to consider (Pérez-Calero *et al.*, 2019; Wang and Song, 2016): its richness, in terms of the variety of resources and information of a diverse board, as opposed to the problems of consensus and coordination that can exist in this type of board. When the presence of founding members on the board is high, it happens that those who have worked together in the past are likely to have developed trust in one another's abilities and will reach a consensus on their decision-making more easily. In this case, the board will have a lower diversity in terms of resources and knowledge. On the other hand, if there are fewer founding members on the board, the variety of resources and knowledge of the board increases, but consensus on decision-making such as R&D will become more difficult. In summary, several aspects must be considered, in order to analyse and to gain a clear picture of the effect of board composition and its diversity, because, its overall effect is neither positive nor negative, as a general rule. Instead, it rather depends on certain factors such as the ownership structure of the company (Ben-Amar *et al.*, 2013), among others. Accordingly, curvilinear relationships between the diversity of board composition and company results have been suggested in many studies (Aggarwal *et al.*, 2019).

In the context of SMEs, Wang & Song (2016) pointed out that there are two critical functions associated with the founders: the effects of stewardship and of imprinting. The stewardship effect highlights identification with the firm, whereas the imprinting effect focuses on how experience, knowledge, and perspectives of the firm can be shaped by the founding members of the board. Thus, on the one hand, confidence and the limitation of internal conflicts that can be generated by the presence of

founding members on the board will facilitate decision-making, as there is a higher consensus within the group. On the other hand, their presence can limit the diversity of information and lead to a lack of decision alternatives, which will slow down the decision-making process. Following the same line of argument, Wang & Song (2016) suggested a non-linear curvilinear relationship between the ratio of founding boardroom members and performance following the initial public offering, concluding that an optimal ratio of founding boardroom members appears to exist. In summary, there is a need for a joint examination of group consensus in decision-making and the resources provided by the founding directors at each stage in the life of the company.

In the context of SMEs listed on the AIM, and in relation to innovation, the diversity of the board members is particularly relevant, in terms of their functional and industrial backgrounds (Pérez-Calero *et al.*, 2019). Investors seem to appreciate both the knowledge and the information arising from the diversity of experience, which builds confidence in the effectiveness of the decision - making process (Wang & Song, 2016). From our perspective, and in the particular context of SMEs (Arzubiaga *et al.*, 2018a, b; Deb & Wiklund, 2017) listed on the AIM, we argue that there is a U-shaped relationship between the presence of founding members on the board and R&D. Thus, higher numbers of founding boardroom members across companies can be related to a reduction of expenditure on R&D. An effect that is due to the lack of specialization of these directors (Ortega-Argiles *et al.*, 2005), as well as boardroom limitations, in terms of knowledge of possible alternative decisions (Wang & Song, 2016). Different types of board members facilitate access to valuable and varied technical business advice, knowledge and networks that provide others resources such as information on consumers, competitors and legitimacy. Firms such as SMEs with fewer resources need to obtain complementary resources, so that they can minimize risk within the business environment and innovate with greater guarantees of success (Ashwin *et al.*, 2019). Likewise, a high presence of founding members of the board will limit the number of independent outsider directors (Ashwin *et al.*, 2016) who can provide access to external resources (Hillman and Dalziel 2003; Peng 2004) promoting innovation (Shapiro *et al.*, 2015). In summary, a high presence of founding members on the board means that this governing body is less diverse. In the case of listed SMEs, the resources provided by these founding board executive directors are less adapted to the needs of their new stage in life.

However, when there is a very high presence of founding members on the board, and taking into account arguments relating to consensus and decision-making confidence (Wang & Song, 2016), their deep knowledge of the company (Block, 2012); the intrinsic motivation of the founding members

(Barringer *et al.*, 2005; Nelson, 2003; Wasserman, 2006); and, interest in growth-oriented goals that are aligned with organizational interests (Nelson, 2003; Wasserman, 2006), will all contribute to a recovery of R&D expenditure. In summary, the benefits of consensual decision-making will at this point outweigh any absence of a variety of boardroom resources. Furthermore, a higher ratio of founding members can inhibit overconfidence, that can otherwise make them short-sighted with regard to their adaptation to changes within the business environment, as they will all participate in the management of decision-making. It will therefore be possible to take advantage of the internal and the external connections of the directors, which will facilitate access to both knowledge and resources (Cao *et al.*, 2006; Collins and Clark, 2003; McDonald *et al.*, 2008) that are necessary for innovation. Moreover, the control that the founding members exercise within the boardroom may positively signal group consensus (Certo *et al.*, 2009), thereby increasing the speed of R&D-related decision-making (Wang & Song, 2016). These arguments lead us to the following hypothesis:

*H<sub>2</sub>: The relationship between the presence of founding members on the boards of listed SMEs and R&D intensity will be U-shaped, with minimum R&D intensity occurring at intermediate levels of presence of founding members on the boards.*

Younger companies need high levels of innovativeness to enter existing markets (De Cleyn & Braet, 2012) and to create new ones. Younger and smaller firms therefore invest relatively more in R&D than more mature firms (Block, 2012). Huergo & Jaumandreu (2004) demonstrated that more mature Spanish companies had higher levels of innovation, up to a point at which their innovation levels began to decline and became far less relevant in the later stages of their life cycle (Van Gils *et al.*, 2004). While age may be an indicator of experience, it may also be an indicator of 'sclerotic thinking' or of inertia on the part of the management team. Thus, entrenched routines may be less useful under very different business conditions (Love *et al.*, 2016).

The age of SMEs has already been considered as a moderating variable in studies focused on R&D (Battaglia *et al.*, 2018). In the literature on the life cycle of organizations (Sørensen & Stuart, 2000), age is the main variable that reflects resource availability. There is a direct relationship between the age of the company, its reputation and its capability to obtain the resources needed for innovation. Age also influences the degree of complexity in the management of innovative projects. Thus, from the resource dependence view, the age of the firm can serve as a proxy for firm complexity (Palacín-Sánchez *et al.*, 2019).

The youngest SMEs have less market reputation and greater limitations on capturing external resources (Battaglia *et al.*, 2018; Serrasqueiro & Macas, 2012). In the younger listed SMEs, a larger presence of founding members on the board will decrease its propensity to invest in R&D, because the

founding board members may lack specialist knowledge and possess limited information on possible investment alternatives, because their company lacks market experience.

Firms growing very rapidly appear to have a greater need for new sets of managerial and professional skills that the founders may not possess (Boeker & Karichalil, 2002). Furthermore, given the limited number of years of younger companies on the market, the benefits derived from mutual knowledge between the founding members that facilitates consensual decision-making (Wang & Song, 2016) are less likely.

Besides, a higher ratio of founding board members of the youngest listed SMEs is accompanied by a lower presence of independent outside directors, who bring important resources for the acquisition of external resources, reputation, and legitimacy for the company (Chahine *et al.*, 2011) and its innovation (Brunninge *et al.*, 2007). Given their limited experience on the market, young listed SMEs can accelerate their learning by appointing outside advisors with sufficient knowledge of the management of the company (Child *et. al.*, 2017).

Conversely, companies that are already consolidated in the market can leverage the advantages that the founding board members may offer in terms of knowledge, reputation and experience to make decisions on R&D expenditure, as they have been working in the company for many years. The participation of founding members on the board appears to be an important source of power, which permits them to better protect their own position as the firm evolves. Following the arguments of the resource-based view, it may be critical to retain certain founding members (those with R&D backgrounds), in order to ensure the future success of the firm (Boeker & Karichalil, 2002). These arguments lead us to the third and final hypothesis:

*H<sub>3</sub>: The age of listed SMEs will moderate the curvilinear relationship between the presence of founding members on the board and R&D intensity, in such a way that:*

*H<sub>3a</sub>: The negative aspects will become stronger within listed SMEs of a younger age.*

*H<sub>3b</sub>: The positive aspects will become weaker within listed SMEs of a younger age.*

### **3. Data and methodology**

#### **3.1 Sample**

We focused on firms listed on the Spanish alternative investment market (MAB) in our study of the relationship between board composition in listed SMEs and R&D intensity. The MAB is a second-tier market dedicated to young and growing companies and offers opportunities to smaller firms to raise new capital (Mallin & Ow-Yong, 1998). MAB-listed companies are of varying sizes and belong to different

sectors, but they all have to pursue sustainable growth, usually with an international vocation and innovation in either their products/services, or management, or distribution processes, or manufacturing<sup>1</sup>.

Access to finance is one of the fundamental challenges to innovation and growth, especially for SMEs. Many SMEs therefore try to approach traditional financial intermediaries, but access to and the cost of this type of financing means that it is scarcely effective. Alternative markets are recent in Spain, however, the MAB is modelled on others that have been in existence for much longer, such as London's AIM (active since 1995) and Alternex in Paris (2005). The companies listed on the MAB seek expansion through innovation and they therefore seek to attract the necessary funding through a public market.

MAB-listed companies are usually on a fast-track towards becoming a public company, which brings different challenges. According to Colombelli (2010), these firms are of interest to our study for the following reasons: i) there are no minimum requirements (regarding size, shareholders, etc.) for inclusion on this market; (ii) they are highly innovative companies, whose managers and investors are involved in entrepreneurship and innovation; and, finally, (iii) MAB-listed firms are expected to follow strict rules and guidelines when compiling specific information. Consistent information could therefore be found for comparisons between each firm. Using the above arguments, the sample comprised all MAB-listed firms between 2010 and 2017, over which time the number of firms increased from 7 firms in 2010, to the 39 firms that comprised the MAB in 2017. This sample constituted unbalanced panel data, which varied from 176 to 285 firm observations per year. On average and over the time horizon, these companies have 172 employees and sales of less than €19 million. The data were obtained from the various documents published on the MAB website (admission documents, financial reports and relevant facts).

We would highlight here the characteristics of Spanish boards: i) they have a single council, unlike other European countries (Heidrick & Struggles, 2011), formed by inside or executive and outside directors; and, ii) they demonstrate a high presence of inside directors (70%) and ownership concentrations. The companies listed on the MAB are subject to the same codes of good governance as those listed on the primary market. In 2017, the level of board independence among MAB firms was 21.25%. Finally, the average tenure of MAB company directors was four years.

### **3.2 Dependent variable**

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<sup>1</sup> <https://www.bolsasymercados.es/mab/ing/MaB/IAMaB.aspx>

Research and development can be considered as a good proxy for innovation (Ashwin *et al.*, 2016; Ojok & Okema; 2016). High levels of R&D investment enable firms to strengthen their innovation capabilities (Tsai & Wang, 2004). In line with prior studies, we used the R&D spending/sales income ratio (Cho & Kim, 2017; Fernández & Nieto, 2006; Shilling & Phelps, 2007; Shaikh *et al.*, 2018). This variable was obtained from the financial reports of each company available from the MAB website.

### **3.3 Independent variables**

**Founder CEO:** In accordance with other studies, this is a dummy variable, where 1 indicates that the CEO is a founder (Cheng & Chuang, 2009; Miller *et al.*, 2011). This variable was obtained from the admission documents of each company and by year-to-year comparisons of the CEO.

**Founder-board member ratio:** This measure is defined as the percentage of founding members on the board (Anderson & Reeb, 2003; Cheng & Chuang, 2009). A board member who was described as “starting the business” was classified as a founder. Following Wang and Song (2016), we opted for a relative measure rather than absolute terms for the following reasons: i) research on group composition establishes that when there is diversity among the components, the relationship or proportion is the appropriate measure; ii) it allows both the wealth of the diversity of the board and the level of consensus to be captured. In our sample, board size was between 2 and 18, and the number of founding board members ranged between 0 and 4. This variable was obtained by comparing MAB admission documentation with the composition of the board as reported each year in the annual report.

### **3.4 Moderator variable**

Firm age was measured as the number of years since its establishment. The most mature firms have a better understanding of the market and greater access to the resources required for growth (Barroso *et al.*, 2011; Zahra *et al.*, 2007), while younger firms may have limited experience and therefore greater entrepreneurship and innovation challenges (Arzubiaga *et al.*, 2018b). Besides, a firm’s age influences the flexibility of the routines used for innovation, its reputation and the availability of assets needed to bring innovation to the market (Battaglia *et al.*, 2018). The data were taken from the MAB incorporation report of each company.

### **3.5 Control variables**

We included the following set of control variables, in order to minimize any interference that might limit the explanatory power of our model.

**Duality:** This is a very common phenomenon in SMEs (Arosa *et al.*, 2013). A CEO who holds the position of chairman may influence the level of R&D expenditure and overall innovation (Cho &

Kim; 2017; Kor, 2006). Duality was operationalized as a dummy variable, where 1 denotes a CEO holding the position of chairman, and zero in the opposite case.

**Tenure:** The previous literature indicates that as the director's tenure increases, there is an increase in both the resources and the ability to intensify R&D (Bravo & Reguera-Alvarado, 2017). As with earlier studies of boards (Barroso *et al.*, 2011; Kor & Sundaramurthy, 2009) we measured board tenure by calculating the number of years that directors had served on the board as the difference between the current year and the year of their appointment. We then calculated the average of all of the directors' years of tenure. This variable was obtained from admission documents and all the relevant facts on board composition published on the Mab website for each company.

**Outside director ratio:** Director type is considered in the previous literature as a critical attribute when carrying out the board's strategic role (Kaczmarek *et al.*, 2012; Kor & Sundaramurthy, 2009). In SMEs, the presence of outside directors is consistently recommended, because they provide access to business experts (e.g., senior executives of other companies) and other support specialists (scientists, lawyers, consultants, bankers and so on) to achieve successful innovation. As with other studies, this variable was measured by the *proportion of outside directors* (Anderson & Reeb, 2003; Ashwin *et al.*, 2016; Bhagat & Bolton, 2008; Chen & Chuang, 2009) on the board, expressed as a percentage of the total number of its directors.

**Inside director ratio:** This variable was measured by the total number on the Top Management Team (TMT) excluding the CEO, who are directors, divided by board size (Joseph *et al.*, 2014) as boards with high proportions of insiders may be more innovative (Shaikh *et al.*, 2018; Zahra, 1996). The variable was obtained from admission documents and the revision of relevant facts of each company.

**Number of years on the MAB:** This time-span was measured by the number of years since the firm was listed on the MAB. We used this variable because SMEs use this public market to access resources that will fund further innovation and growth (Colombelli, 2010).

**Board size:** The literature suggests that board size negatively affects firms' innovation since, given the complexity and the risk that an innovation project brings, the problems of coordination and consensus within large boards are greater (Zona *et al.*, 2013). Board size was measured as the number of directors.

**Firm size:** The literature suggests that innovation is facilitated in larger firms because these firms have more sophisticated and advanced innovation capabilities (Zona *et al.*, 2013). Firm size was measured by the logarithm of the firm's total sales (Nason *et al.*, 2019). This variable was obtained from the annual financial report.

**Industries:** Our sample included firms from a variety of industry sectors. Industry trends may affect board effectiveness (Johnson *et al.*, 2013), so we also included industry dummies. This was done by using the unified industry stock exchange classification proposed by the National Securities Market Commission (CNMV, 2006), which includes the following categories: (1) renewable energy; (2) pharmaceutical and biotechnology products; (3) engineering, services, and commerce; and, (4) electronics, software and telecommunications. We created three dummy variables for sectors 2, 3 and 4, using sector 1 as our reference. The data were obtained from the MAB website.

### 3.6 Empirical model

A primary concern guiding our choice of empirical model was causality arising from issues of endogeneity. Endogeneity creates difficulties for analysis, which, if not controlled, means that the results can generate errors and inconsistent estimations (Hermalin & Weisbach, 2000; Pombo & Gutiérrez, 2011; Ullah *et al.*, 2018). One issue within board research is that board composition is not determined exogenously, but is rather affected by prior decisions and firm characteristics that in turn affect board decisions. Thus, any observed relationship between board composition and firm outcomes may in fact be caused by the factors that determined board composition in the first place (Johnson *et al.*, 2013). In our study, to detect potential endogeneity, the Durbin-Wu-Hausman (DWH) test was carried out on the model's variables. Given that the null hypothesis of this test establishes the absence of endogeneity, the results of the DWH test confirmed the presence of endogeneity in the following control variables: outside directors ratio ( $\text{Chi}_{\text{Durbin-Wu-Hausman test}}^2 = 4.503, p - \text{value} = 0.03338$ ), Tenure ( $\text{Chi}_{\text{Durbin-Wu-Hausman test}}^2 = 7.517, p - \text{value} = 0.0061$ ), and Firm size ( $\text{Chi}_{\text{Durbin-Wu-Hausman test}}^2 = 4.454, p - \text{value} = 0.0348$ ). As a result, these three variables were included in the model as endogenous regressors and the other variables were included as exogenous regressors. The presence of endogenous regressors makes it necessary to adopt an approximation of the instrumental variables to estimate the regression coefficients, since the use of Ordinary Least Squares (OLS) or static panel data models could produce biased and inconsistent results. In our investigation, we chose to use the Generalized Method of Moments (GMM) estimation technique, a dynamic panel data method that stands out from other techniques for a number of reasons: i) GMM was especially designed for autoregressive models. It can therefore be theoretically argued that the R&D ratio of the firms in the sample will demonstrate persistence over the timeframe under consideration, which is to say, the current values of this variable could be influenced by their previous values. This persistence in the dependent variable requires the use of autoregressive regression models, and GMM offers greater efficiency and



performance in research contexts where the dependent variable is persistent (Arellano & Bover, 1995; Blundell & Bond, 1998); ii) secondly, unlike other instrumental variable methods such as two stage least squares (2SLS), GMM needs no other instruments from other sources. In GMM, the instrumental variables were obtained from lagged values of the potentially endogenous variables (Arellano & Bover, 1995) and, in all cases, the second lag was included in the estimation as an instrumental variable; iii) GMM is a solid and robust method for heterocedasticity and serial correlation, particularly in panel data (Capezio *et al.*, 2011; Ullah *et al.*, 2018).

We used the following specification, to estimate the relationship between the proposed independent variables and the R&D ratio, where  $i$  and  $t$  represent firm and year, respectively;  $\eta_i$  is the possible firm-specific component of the error term and  $\varepsilon_{it}$  is the error term.

$$\begin{aligned}
 R\&D\ Ratio_{it} &= \beta + \alpha_0 R\&D\ Ratio_{it-1} + \alpha_1 Founder\ CEO_{it} + \alpha_2 Founder - board\ member\ ratio_{it} \\
 &+ \alpha_3 Founder - board\ member\ ratio_{it}^2 + \alpha_4 Firm\ age \times Founder - board\ member\ ratio_{it} \\
 &+ \alpha_5 Firm\ age \times Founder - board\ member\ ratio_{it}^2 + \alpha_6 Duality_{it} + \alpha_7 Tenure_{it} \\
 &+ \alpha_8 Outside\ directors\ ratio_{it} + \alpha_9 Inside\ directors\ ratio_{it} + \alpha_{10} MAB\ age_{it} + \alpha_{11} Board\ size_{it} \\
 &+ \alpha_{12} Firm\ size_{it} + \alpha_{13} Industries_{it} + \alpha_{14} Firm\ age_{it} + \eta_i + \varepsilon_{it}
 \end{aligned}$$

Table 2 sets out the descriptive statistics of the variables of the study and Table 3 indicates the correlation matrix of the sample.

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Insert Table 2 here

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We also calculated the variance inflation factors (VIF), to detect the possible presence of multicollinearity between the explanatory variables. As can be seen in Table 2, these values ranged between 1.28 and 2.24, well below the limit of 10 suggested for multiple regression models (Griffith & Harvey, 2001). Multicollinearity was not therefore a problem for the explanatory variables in this study.

## 4. Results

Table 4 describes the models used to test our hypotheses. The Base Model includes only the control variables, Model 1 adds the founder CEO variable, Model 2 adds the linear and quadratic founder-board member ratio, and Model 3 adds the interaction between the linear and quadratic founder-board member ratio and firm age to Model 2.

Hypothesis 1 proposed that if the CEO is also the founder of the firm, it will have a negative effect on the R&D ratio. The coefficient of Model 1 is significant ( $\alpha_1 = -4.4797$ ,  $p - value = 0.000$ ) and negative, that is to say, when the CEO was a founding member of the firm, R&D intensity was lower

than in other cases. This result was again confirmed in Model 2 ( $\alpha_1 = -5.2939$ ,  $p - \text{value} = 0.000$ ), but not in Model 3 ( $\alpha_1 = 2.1115$ ,  $p - \text{value} = 0.317$ ).

With regard to Hypothesis 2, on the ratio of founding board members and its effect on the R&D ratio, Model 2 shows the estimated coefficients of the linear and the quadratic relationship. Both the first ( $\alpha_2 = -0.4234$ ,  $p - \text{value} = 0.000$ ) and the second ( $\alpha_3 = 0.0028$ ,  $p - \text{value} = 0.019$ ) were significant, although the first had a negative value. The results supported the proposed arguments and suggested that higher ratios of the founding board members entailed lower R&D ratio, until an inflection was reached point (when the percentage of founder members on the board exceeded 56.44%) at which point R&D intensity was higher (see Figure 2). Taking into account that the average size of the board in the sample was approximately 7 members, the average inflection point was reached with 4 founder directors. In other words, the presence of the founding members on the board only had a positive effect on the R&D ratio, if they occupied over half of the seats on the board, which is to say, more than 4 founder directors on average. Below this figure (56.44% or 4 founder directors), their influence was negative. These results were confirmed in Model 3 ( $\alpha_2 = -1.1943$ ,  $p - \text{value} = 0.011$ )( $\alpha_3 = 0.0106$ ,  $p - \text{value} = 0.039$ ).

Insert Table 3, Table 4 and Figure 2 here

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Finally, Model 3 shows the results of the potential moderating effect of the variable firm age, in relation to Hypothesis 3, on the linear and quadratic relationship between the ratio of founding members on the board and the R&D ratio. The results demonstrated the effect of this moderator variable and furthermore, they confirmed the proposed arguments that the firm age variable moderated both the linear ( $\alpha_4 = 0.0808$ ,  $p - \text{value} = 0.004$ ), and the quadratic relation ( $\alpha_5 = -0.0009$ ,  $p - \text{value} = 0.039$ ); although in the latter case the moderation is negative. This means, as shown in Graphic 3, that in young firms the R&D ratio reduces as the ratio of founders increases. However, in more mature firms, this effect is inverted, such that at higher ratios of founding members on the board, the R&D ratio is likewise higher. However, although the higher ratio of founding members improves the R&D ratio in these firms, it is much lower than the ratio within younger firms with fewer founding members on their boards. As a complementary adjustment measure for the model, the  $\text{Chi}^2$  statistic confirms that all of the models are globally significant (see Table 4).

The results relating to the control variables showed that firms with duality on their boards (Models 2 and 3), with lengthier board tenure (Base Model and Models 2 and 3), a higher ratio of outside directors (Base Model, Model 1), a lower percentage of managers (Base Model, Models 2 and 3), an older

MAB age (Base Model, Models 2 and 3) and of a smaller size (base Model, Models 1, 2, 3 and 4), demonstrated higher R&D ratios.

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Insert Figure 3 here

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Finally, due to the presence of endogenous regressors in the model and, in order to guarantee the validity of the instruments (Roodman, 2009), we ran the Hansen test (see Table 4). Similarly, there should be no serial second-order correlation between the residuals when dynamic panel data methods are used (Capezio, 2011), an aspect that was checked with the Arellano-Bond second order autocorrelation test (see Table 4).

## 5. Discussion

How can the presence of founding members in the governing bodies of SMEs affect their R&D intensity when they are initially listed on the MAB? Little attention has been paid to this question and research on the composition of the board of these SMEs and R&D intensity has also been limited. Our investigation sheds light on the role of the founding members of a firm within its governance bodies (Gedajlovic *et al.*, 2004; Zahra & Filatotchev, 2004; Wang & Song, 2016) within a segment of SMEs that is especially important for the future of the economic structure of a modern economy (European Commission, 2019) –those SMEs that seek new opportunities for growth and expansion through innovation (Gao and Hafsi, 2015; Rammer *et al.*, 2009) and that, to do so, choose to be listed on the alternative stock market (Colombelli, 2010). Opting for this new stage in the life of the company, which is crucial for its innovation, implies making changes to its governance structure. On the one hand, these changes directly affect the role played by the founding members of the company and their participation in these governance bodies. On the other hand, these changes are not always simple, given the founders' influence and interests in their firms (Gedajlovic *et al.*, 2004) or because of external factors, such as the type of economy in which they are embedded or the degree of formality of their institutions (Hearn & Filatotchev, 2019). We have widened the traditional focus on the composition of the board, embracing a broader view of its characteristics that affect decision-making strategies such as innovation (Rezaei & Ort, 2018), in order to arrive at a deeper and more nuanced understanding of the effect of the founders on innovation intensity (Kammerlander *et al.*, 2015; Simsek *et al.*, 2010; Duran *et al.*, 2016) among listed SMEs.

Drawing on the resource-based view of the firm (Prahalad & Hamel, 1990; Barney, 1991) resource dependence theory (Pfeffer & Salancik, 1978; Hillman *et al.*, 2009), and Penrosean theory (Nason & Wiklund, 2018; Penrose, 1955), our study of all of the firms quoted on the MAB between 2010 and 2017 showed that, if their innovation intensity is to increase, then these listed SMEs must ensure that the roles of the founding members on their boards are less prominent, both as CEO and as director. Similarly, we point out that the relation between the number of founding members on the board and innovation intensity is greater, in negative terms, when the firm is younger and therefore less established in its market. In general, these findings reveal the distinctive aspects of the board of directors in these SME, which pursue other strategic goals. They underline the importance of taking account of the structure and composition of these governing bodies when considering the innovation required for the future development of these firms. It is worth pointing out that our study shows differences in these variables compared to other types of SMEs. Our work therefore brings new knowledge to the literature on corporate governance, innovation and SMEs.

Firstly, and in line with the previous point, our study shows that the presence of a founder CEO on the board of listed SMEs has a negative effect on R&D intensity. It is probably one of the most outstanding results of our work since, until now, SMEs have highly valued the resources that this figure can contribute to the firm's future (Caliendo *et al.*, 2009; Cao *et al.*, 2015; Miller *et al.*, 2011). However, despite these contributions, their presence on the board of listed SMEs has negative effects on incentivising R&D intensity. This is because the abilities and capabilities required for this new step in the firm's life are different from those that they possess, which impedes their ability to analyse new alternative ways of innovating (Jain & Tabak, 2008). Our research contributes to the existing literature when it points out the different value of the different types of directors of the company (Shi, Xu & Zhang, 2018), as well as that this value is transformed as the company changes from one stage to another.

In this respect, it would be extremely interesting to analyze whether there is a person who, as the highest responsible executive, is able to combine the benefits of the founder's experience and knowledge of the firm (Colombelli, 2010) with the exploitation of the contact networks (Deb & Wiklund, 2017) and at the same time incorporate the new capabilities and skills (Filatotchev *et al.*, 2006b) that are required to develop and set in motion this new stage for the firm. We have therefore included the variable CEO-heir as a supplementary analysis, in order to improve the results. In accordance with other authors, we considered that the presence of subsequent generations introduces a new entrepreneurial vision to the firm (Cao *et al.*, 2015) that favours innovation. In this way, and in the case of family firms, the work of Duran *et al.* (2016) concluded that when the firm's CEO is from a subsequent generation to the founder, there is

a stronger relationship with innovation. Therefore, and applying these arguments to the specific case of the SMEs analysed in our study, we used a dummy variable equal to 1 if the CEO is an heir of the founder, and 0 if otherwise.

However, we must point out that there is a much lower presence of CEO-heirs in the sample than founder CEOs (8%). The results incorporating this new variable in the model are shown in Table 5. The table shows a significant and positive relationship ( $p$ -value = 0.004), between CEO-heir and R&D intensity. These results shed new light on the governance structure of these SMEs, suggesting a new area for future investigation: these firms are more innovative if their board includes directors who combine their knowledge of the contact networks inherited from their predecessors who founded the company, with the skills and capabilities that they contribute as a new generation.

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Insert Table 5 here

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Secondly, our work has shown that the presence of founding members on the board has a U-shaped relation (Wang & Song, 2016) with R&D intensity. Thus, as the proportion of founding members on the board increases, R&D decreases, until it reaches an inflection point from which the increase in this proportion reverses the relation with R&D, and becomes positive. These results chime with the arguments regarding the richness of board diversity (Pérez-Calero *et al.*, 2019), which is achieved through its professionalization, as this diversity requires a greater variety of resources that are gained through knowledge and network connections, and facilitate innovation. The board's ability to achieve consensus in its decision-making and the directors' prior experience (Bommaraju, *et al.*, 2019) only gives priority to R&D when the proportion of founding members on the board is very high, although this is always at a lower level than indicated earlier. Finally, our investigation shows that firm age moderates this relationship. Younger firms with less experience in their respective markets need to build on the knowledge and contacts afforded by their independent outside directors (and reducing the presence of founders), so that R&D may be more achievable than in more mature firms. The latter have already benefitted from years of market experience when they join the MAB, which helps them continue with less professionalized governance structures, even though they are less innovative than younger firms. In summary, and unlike the latest trends in corporate governance (Li *et al.*, 2018), SMEs listed on the AIM must restructure their governance bodies to innovate.

In conclusion, our work has made a valuable contribution to the research on innovation in SMEs. Essentially, we have focused on the role of the founding members of these SMEs, highlighting the

importance of the professionalization of the board of directors, in order to assist innovation. Moreover, by adopting the resources and capabilities-based perspective and resource dependence theory, our investigation has demonstrated the importance of board composition for this type of company, pointing out that this is the mechanism through which it is possible to enhance the knowledge, abilities, experience and relationship networks required to drive innovation. Similarly, and following the contributions of Nason & Wiklund (2018), we have advocated the necessary versatility of the board to adapt to new changes in the business environment.

These results have important practical implications for the management of SMEs. Taking as our starting point the interest that many of these companies have in growth and expansion, it is vital that they understand that their governance bodies are important mechanisms both for their strategic orientation (Arzubiaga *et al.*, 2018a) and their management and that these must include a certain degree of diversity (Pérez-Calero *et al.*, 2019) and professionalization (Filatotchev *et al.*, 2006), like their counterparts in large firms. A high presence of founding members on the board at this stage of the firm's life is counterproductive to its strategic interests.

Finally, we recognise that our work presents a number of limitations, which in turn create new opportunities for future research. Firstly, firms listed on the Spanish MAB have been examined in our work. Both the economic and the cultural characteristics of this country affect the number and type of SMEs that choose to join this market, which will be different in other countries. While we do not expect there to be any significant differences, the inclusion of other alternative investment markets would assist the generalization of the results. Secondly, our investigation is based on variables linked to board composition. Looking ahead, these results could be improved by incorporating variables linked to both the human and the relational capital of the board members (Garg *et al.*, 2019; Kato *et al.*, 2015), in order to increase the degree of explanation.

## REFERENCES:

- Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of Management Reviews*, 8 (1): 21–47.
- Aggarwal, R., Jindal, V., & Seth, R. (2019). Board diversity and firm performance: The role of business group affiliation. *International Business Review*, 28(6), 101600.
- Ahmad, N. H., Halim, H. A., & Zainal, S. (2010). Is entrepreneurial competency the silver bullet for SME success in a developing nation. *International Business Management*, 4, 67-75
- Anderson, R. & Reeb, D. (2003). Founding family ownership and firm performance: Evidence from the SP 500, *Journal of Finance*, 58, 1301-1328.
- Añón-Higón, D., Manjón-Antolín, M., Mañez, J. A., & Sanchis-Llopis, J. A. (2015). Does R&D protect SMEs from the hardness of the cycle? Evidence from Spanish SMEs (1990-2009). *International Entrepreneurship and Management Journal* 11.2: 361-376.
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51.
- Arosa, B., Iturralde, T., & Maseda, A. (2013). The board structure and firm performance in SMEs: Evidence from Spain. *Investigaciones Europeas de Dirección y Economía de la Empresa*, 19, 127-188

- Arzubiaga, U., Iturralde, T., Maseda, A., and Kotlar, J. (2018b). Entrepreneurial orientation and firm performance in family SMEs: the moderating effects of family, women, and strategic involvement in the board of directors. *International Entrepreneurships and Management Journal*, 14, 217-244.
- Arzubiaga, U., Kotlar, J., De Massis, A., Maseda, A., & Iturralde, T. (2018a). Entrepreneurial orientation and innovation in family SMEs: Unveiling the (actual) impact of the Board of Directors. *Journal of Business Venturing*, 33, 455-469.
- Ashwin, A. S., Krishnan, R. T., & George, R. (2016). Board characteristics, financial slack and R&D investments: An empirical analysis of the Indian pharmaceutical industry. *International Studies of Management & Organization*, 46(1), 8-23.
- Balkin, D. B., Markman, G. D., & Gomez-Mejia, L. R. (2000). Is CEO pay in high-technology firms related to innovation? *Academy of Management Journal*, 43(6), 1118-1129.
- Bammens, Y., Voordeckers, W., & Van Gils, A. (2011). Boards of directors in family businesses: A literature review and research agenda. *International Journal of Management Reviews*, 13(2), 134-152.
- Barker, V. L., & Muller, G. C. (2002). CEO characteristic and firm R&D spending. *Management Science*, 48, 1, 782-801.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17 (1), 99-120.
- Barringer, B. R., Jones, F. F., & Neubaum, D. O. (2005). A quantitative content analysis of the characteristics of rapid-growth firms and their founders. *Journal of Business Venturing*, 20(5), 663-687.
- Barroso, C., Villegas, M. M., & Pérez-Calero, L. (2011). Board influence on a firm's internationalization. *Corporate Governance: An International Review*, 19(4), 351-367.
- Battaglia, D. Neirotti, P., & Paolucci, E. (2018). The role of R&D investments and export on SMEs' growth: a domain ambidexterity perspective. *Management Decisions*, 56, 1883-1903.
- Baysinger B. D., Kosnik R. D., & Turk T. A. (1991). Effects of board and ownership structure on corporate R&D strategy. *Academy of Management Journal*, 34, 205 - 214.
- Beckman, C. M., Burton, M. D., & O'Reilly, C. (2007). Early Teams: The Impact of Team Demography on VC Financing and Going Public. *Journal of Business Venturing* 22(2), 147 - 173.
- Belloc, F. (2014). Innovation in State-Owned Enterprises: Reconsidering the Conventional Wisdom, *Journal of Economic Issues*, 48:3, 821-848
- Belloc, F., Laurenza, E., & Rossi, M. A. (2016). Corporate governance effects on innovation when both agency costs and asset specificity matter. *Industrial and Corporate Change*.
- Ben-Amar, W., Francoeur, C., Hafsi, T., & Labelle, R. (2013). What makes better boards? A closer look at diversity and ownership. *British Journal of Management*, 24(1), 85-101.
- Berraies, S., & Rejeb, W. B. (2019). Boards of directors' roles and size: what effects on exploitative and exploratory innovations? Case of listed Tunisian firms. *International Journal of Entrepreneurship and Innovation Management*, 23(2), 161-179.
- Block, J. H. (2012). R&D investments in family and founder firms: An agency perspective. *Journal of Business Venturing*, 27(2), 248-265.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.
- Boeker, W., & Karichalil, R. (2002). Entrepreneurial Transitions: Factors Influencing Founder Departure. *Academy of Management Journal*, 45, 818-826
- Bommaraju, R., Ahearne, M., Krause, R., & Tirunillai, S. (2019). Does a Customer on the Board of Directors Affect Business-to-Business Firm Performance? *Journal of Marketing*, 83(1), 8-23.
- Bravo, F., & Reguera-Alvarado, N. (2017). The effect of board of directors on R&D intensity: board tenure and multiple directorships. *R&D Management*, 47(5), 701-714.
- Brouthers, K., Nakos, G., & Dimitratos, P. (2015). SME Entrepreneurial Orientation, International Performance, and the Moderating Role of Strategic Alliances, *Entrepreneurship Theory and Practice*, 39, 1161-1187.
- Brunninge, O., Nordqvist, M., & Wiklund, J. (2007). Corporate governance and strategic change in SMEs: The effects of ownership, board composition and top management teams. *Small Business Economics*, 29(3), 295-308.
- Burt, H. R. (1992). *Structural Holes: The Social Structure of Competition*. Harvard University Press, Cambridge, MA
- Caliendo, M., Fossen, F. M., & Kritikos, A.S. (2009). Risk attitudes of nascent entrepreneurs – new evidence from an experimentally validated survey. *Small Business Economics*, 32,(2), 153-167.
- Cannella Jr, A. A., Jones, C. D., & Withers, M. C. (2015). Family-versus lone-founder-controlled public corporations: Social identity theory and boards of directors. *Academy of Management Journal*, 58(2), 436-459.

- Cao, Q., Maruping, L. M., & Takeuchi, R. (2006). Disentangling the effects of CEO turnover and succession on organizational capabilities: A social network perspective. *Organization Science*, 17(5), 563-576
- Cao, Q., Simsek, Z., & Jansen, J. J. (2015). CEO social capital and entrepreneurial orientation of the firm: Bonding and bridging effects. *Journal of Management*, 41(7), 1957-1981.
- Capezio, A., Shields, J., & O'Donnell, M. (2011). Too Good to be True: Board Structural Independence as a Moderator of CEO Pay for Firm Performance. *Journal of Management Studies*, 48(3), 487-513.
- Certo, S. T., Holcomb, T. R., & Holmes Jr, R. M. (2009). IPO research in management and entrepreneurship: Moving the agenda forward. *Journal of management*, 35(6), 1340-1378.
- Chahine, S., Filatotchev, I., & Zahra, S. A. (2011). Building perceived quality of founder-involved IPO firms: Founders' effects on board selection and stock market performance. *Entrepreneurship Theory and Practice*, 35(2), 319-335.
- Chang, S., Wu, W., & Wong, Y. (2010). Family control and stock market reactions to innovation announcements. *British Journal of Management*, 21, 1, 152-170.
- Chen, H-L., & Hsu, W-T. (2009). Family Ownership, Board Independence, and R&D Investment. *Family Business Review*, 22(4), 347-362.
- Chen, V. Y. S., Tsao, S.M., & Chen, G. Z. (2013). Founding family ownership and innovation. *Asia-Pacific Journal of Accounting & Economics*, 20(4), 429-456.
- Chen, Y. R., & Chuang, W. T. (2009). Alignment or entrenchment? Corporate governance and cash holdings in growing firms. *Journal of Business Research*, 62(11), 1200-1206.
- Child, J., Hsieh, L., Elbanna, S., Karmowska, J., Marinova, S., Puthusserry, P., & Zhang, Y. (2017). SME international business models: the role of context and experience. *Journal of World Business*, 52(5), 664-679.
- Cho, S. Y., & Kim, S. K. (2017). Horizon problem and firm innovation: The influence of CEO career horizon, exploitation and exploration on breakthrough innovations. *Research Policy*, 46(10), 1801-1809.
- Collins, C. J., & Clark, K. D. (2003). Strategic human resource practices, top management team social networks, and firm performance: The role of human resource practices in creating organizational competitive advantage. *Academy of management Journal*, 46(6), 740-751.
- Colombelli, A. (2010). Alternative investment market: a way to promote entrepreneurship. *Journal of Industry, Competition and Trade*, 10(3-4), 253-274.
- Colombo, M. G., & Grilli, L. (2010). On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. *Journal of Business Venturing*, 25(6), 610-626.
- Cusmano, L., & Thompson, J. (2013). Alternative financing instruments for SMEs and entrepreneurs: The case of mezzanine finance. OECD Publishing.
- D'Angelo, A., & Presutti, M. (2019). SMEs international growth: The moderating role of experience on entrepreneurial and learning orientations. *International Business Review*, 28, 613-624.
- Dalziel, T., Gentry, R. J., & Bowerman, M. (2011). An integrated agency-resource dependence view of the influence of directors' human and relational capital on firms' R&D spending. *Journal of Management Studies*, 48(6), 1217-1242.
- De Cleyn, S. H., & Braet, J. (2012). Do board composition and investor type influence innovativeness in SMEs? *International Entrepreneurship and Management Journal*, 8(3), 285-308.
- Deb, P., & Wiklund, J. (2017). The Effects of CEO Founder Status and Stock Ownership on Entrepreneurial Orientation in Small Firms., *Journal of Small Business Management*, 55(1), 32-55.
- Deutsch, Y. (2005). The Impact of Board Composition on Firms' Critical Decisions: A Meta-Analytic Review. *Journal of Management*, 31 (3), 424-444.
- Deutsch, Y. (2007). The influence of outside directors' stock-option compensation on firms' R&D. *Corporate Governance: An International Review*, 15, 816-827.
- Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing More with Less: Innovation Input and Output in Family Firms. *Academy of Management Journal*, 59, 4.
- Dushnitsky, G. 2010. Entrepreneurial optimism in the market for technological inventions, *Organization Science*, 21, 301-309
- El Shoubaki, A., Laguir, I., & den Besten, M. (2019). Human capital and SME growth: the mediating role of reasons to start a business, *Small Business Economics*, <https://doi.org/10.1007/s11187-018-0129-y>
- European Commission. (2019). <http://www.europarl.europa.eu/factsheets/en/sheet/63/small-and-medium-sized-enterprises>
- Fernández, Z., & Nieto, M. J. (2006). Impact of ownership on the international involvement of SMEs. *Journal of international business studies*, 37(3), 340-351.
- Filatotchev, I., Toms, S., & Wright, M. (2006a). The firm's strategic dynamics and corporate governance life-cycle. *International Journal of Managerial Finance*, 2(4), 256-279.
- Filatotchev, I., Wright, M., & Arberk, M. (2006b). Venture capitalists, syndication and governance in initial public offerings. *Small Business Economics*, 26(4), 337-350.



- Fischer, H. M., & Pollock, T. G. (2004). Effects of social capital and power on surviving transformational change: The case of initial public offerings. *Academy of Management Journal*, 47(4), 463-481.
- Forbes, D. P., & Milliken, F. (1999). Cognition and corporate governance: understanding board of directors as strategic decision-making groups. *Academy of Management Review*, 24(3), 489-505.
- Gabrielsson, J., & Huse, M. (2005). Outside directors in SME boards: a call for theoretical reflections. *Corporate Board: role, duties and composition*, 1(1), 28-37.
- Garg, S., Li, Q., & Shaw, J. (2019). Entrepreneurial firms grow up: Board undervaluation, board evolution, and firm performance in newly public firms. *Strategic Management Journal*. DOI: 10.1002/smj.3036
- Gao, Y., & Hafsi, T. (2015). R&D spending among Chinese SMEs: the role of business owners' characteristics. *Management Decision*, 53(8), 1714-1735.
- Garg, S., Li, Q., & Shaw, J. (2019). Entrepreneurial firms grow up: Board undervaluation, board evolution, and firm performance in newly public firms. *Strategic Management Journal*. DOI: 10.1002/smj.3036
- Gedajlovic, E., Lubatkin, M. H., & Schulze, W. S. (2004). Crossing the threshold from founder management to professional management: A governance perspective. *Journal of management studies*, 41(5), 899-912.
- Griffith, D. A., & Harvey, M. G. (2001). A resource perspective of global dynamic capabilities. *Journal of International Business Studies*, 32(3), 597-606.
- Guldiken, O., & Darendeli, I. S. (2016). Too much of a good thing: Board monitoring and R&D investments. *Journal of Business Research*, 69(8), 2931-2938.
- Hayward, M. L., Shepherd, D. A., & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management science*, 52(2), 160-172.
- Hearn, B., & Filatotchev, I. (2019). Founder retention as CEO at IPO in emerging economies: The role of private equity owners and national institutions. *Journal of Business Venturing*, 34, 418-438.
- Heidrick, T., & Struggles, H. (2011). Challenging board performance—European report on corporate governance.
- Hermalin, B. E., & Weisbach, M.S. (2000). Boards of directors as an endogenously determined institution: A survey of the economic literature. Working paper, University of California at Berkeley.
- Hernández, A. B., Camelo, C., & Valle, R. (2010). The effects of boards of directors on R&D investments: the case of Spain. *International Journal of Human Resources Development and Management*, 10(2), 152-165.
- Hernández, A., Camelo, C., & Valle, R. (2014). Does board member stock ownership influence the effect of board composition on innovation? *European Journal of International Management*, 8(4), 355-372.
- Herrmann, P., & Datta, D. K. (2005). Relationships between top management team characteristics and international diversification: An empirical investigation. *British Journal of Management*, 16(1), 69-78.
- Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource dependence theory: A review. *Journal of Management*, 35(6), 1404-1427.
- Hsu, W. T., Chen, H. L., & Cheng, C. Y. (2013). Internationalization and firm performance of SMEs: The moderating effects of CEO attributes. *Journal of World Business*, 48(1), 1-12.
- Huergo, E., & Jaumandreu, J. (2004). How does profitability of innovation change with firm age? *Small Business Economics*, 22(3-4), 193-207.
- Jain, B. A., & Tabak, F. (2008). Factors influencing the choice between founder versus non-founder CEOs for IPO firms. *Journal of Business Venturing*, 23, 21-45.
- Jayaraman, N., Khorana A., Nelling D., & Covin, J. (2000). CEO Founder Status and Firm Financial Performance. *Strategic Management Journal* 21(12), 1215-1224.
- Johnson, S. G., Schnatterly, K., & Hill, A. D. (2013). Board composition beyond independence: Social capital, human capital, and demographics. *Journal of management*, 39(1), 232-262.
- Joseph, J., Ocasio, W., & McDonnell, M. H. (2014). The structural elaboration of board independence: Executive power, institutional logics, and the adoption of CEO-only board structures in US corporate governance. *Academy of Management Journal*, 57(6), 1834-1858.
- Kaczmarek, S., Kimino, S., & Pye, A. (2012). Antecedents of board composition: The role of nomination committees. *Corporate Governance: An International Review*, 20(5): 474-489.
- Kammerlander, N., Dessi, C., Bird, M., Floris, M., & Murru, A. (2015). The impact of shared stories on family firm innovation: A multicase study. *Family Business Review*, 28(4), 332-354.
- Kato, M., Okamuro, H., & Honjo, Y. (2015). Does Founders' Human Capital Matter for Innovation? Evidence from Japanese Start-ups. *Journal of Small Business Management*, 53, 1, 114-128.
- Khurshed, A., Kostas, D., & Saadouni, B. (2016). Warrants in underwritten IPOs: The Alternative Investment Market (AIM) experience. *Journal of Corporate Finance*, 40, 97-109.
- Kor, Y. Y., & Sundaramurthy, C. (2009). Experience-based human capital and social capital of outside directors. *Journal of Management*, 35(4), 981-1006.
- Kor, Y. Y. (2006). Direct and interaction effects of top management team and board compositions on R&D investment strategy. *Strategic Management Journal*, 11, 1081-1110.

- Lee, P. G., & O'Neil, H. M. (2003). Ownership structures and R&D investments of U.S. and Japanese firms: agency and stewardship perspectives. *Academy of Management Journal*, 46, 2, 212-225.
- Lee, J.M., Kim, J., & Bae, J. (2020). Founder CEOs and innovation: Evidence from CEO sudden deaths in public firms, *Research Policy*. In press.
- Lee, P. G., & O'Neil, H. M. (2003). Ownership structures and R&D investments of U.S. and Japanese firms: agency and stewardship perspectives. *Academy of Management Journal*, 46, 2, 212-225.
- Lee, P. M. (2005). A Comparison of Ownership Structures and Innovations of US and Japanese Firms. *Managerial and Decisions Economics*, 26, 39-50.
- Li, H., Terjesen, S., & Umans, T. (2018). Corporate governance in entrepreneurial firms: a systematic review and research agenda. *Small Business Economics*, 1-32.
- Love, J. H., & Roper, S. (2015). SME innovation, exporting and growth: A review of existing evidence. *International Small Business Journal*, 33(1), 28-48.
- Love, J. H., Roper, S., & Zhou, Y. (2016). Experience, age and exporting performance in UK SMEs. *International Business Review*, 25(4), 806-819.
- Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of management*, 32(5), 646-672.
- Maldonado-Guzmán, G., Garza-Reyes, J., Pinzón, S., & Kumar, V. (2019). Innovation capabilities and performance: are they truly linked in SMEs? *International Journal of Innovation Science*, 11, 48-62.
- Mallin, C., & Ow-Yong, K. (1998). Corporate governance in small companies—the alternative investment market. *Corporate Governance: An International Review*, 6(4), 224-232.
- McDonald, M. L., Khanna, P., & Westphal, J. D. (2008). Getting them to think outside the circle: Corporate governance, CEOs' external advice networks, and firm performance. *Academy of Management Journal*, 51(3), 453-475.
- Miller, D., Le Breton-Miller, I., & Lester, R. H. (2011). Family and lone founder ownership and strategic behaviour: Social context, identity, and institutional logics. *Journal of Management Studies*, 48, 1-25.
- Narula R. (2004). R&D collaboration by SMEs: new opportunities and limitation in the face of globalization. *Technovation*, 24, 153-161.
- Nason, R. S. & Wiklund, J. (2018). An Assessment of Resource-Based Theorizing on Firm Growth and Suggestions for the Future. *Journal of Management*, 44 (1), 32-60.
- Nason, R. S., Wiklund, J., McKelvie, A., Hitt, M. & Yu, W. (2019). Orchestrating boundaries: The effect of R&D boundary permeability on new venture growth. *Journal of Business Venturing*, 34(1), 63-79.
- Nelson, T. (2003). The persistence of founder influence: Management, ownership, and performance effects at initial public offering. *Strategic Management Journal*, 24, 707-724.
- Nummela, N., Puumalainen, K. & Saarenketo, S. (2005). International Growth Orientation of Knowledge-Intensive SMES, *Journal of International Entrepreneurship*, 3, pages 5–18.
- Ojok, F., & Okema, S. (2016). How Does Board Composition Affect R&D Investments? Master's Thesis.
- Ortega-Argilés, R., Moreno, R. & Suriñach Caralt, J. (2005). Ownership structure and innovation: is there a real link? *The Annals of Regional Science*, 39, 637–662.
- Osma, B. G. (2008). Board independence and real earnings management: the case of R&D expenditure, *Corporate Governance: An International Review*, 16(2), 116-131.
- Palacín-Sánchez, M. J., Bravo, F., & Reguera-Alvarado, N. (2019). Characteristics and determinants of the board of directors of growing Spanish SMEs going public, *Journal of Small Business and Enterprise Development*, 26, 3, 363-380,
- Parker, S. C. (2018). *The economics of entrepreneurship*. Cambridge University Press.
- Peng, M. W., & Luo, Y. (2000). Managerial ties and firm performance in a transition economy: The nature of a micro-macro link. *Academy of Management Journal*, 43(3), 486-501.
- Penrose, E. (1955). Limits to the Growth and Size of Firms. *The American Economic Review*
- Pérez-Calero, L., Larrañeta, B. & Wright, M. (2019). Initial public offering valuation and prior shared experience in the boardroom of threshold ventures: A study of industry effects. *Corporate Governance: An International Review*. <https://doi.org/10.1111/corg.12281>
- Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations. A Resource Dependence Perspective*, New York: Harper & Row.
- Picken, J.C. (2017). From founder to CEO: An entrepreneur's roadmap. *Business Horizons*, 60, 7-14
- Pombo, C., & Gutiérrez, L. H. (2011). Outside directors, board interlocks and firm performance: Empirical evidence from Colombian business groups. *Journal of Economics and Business*, 63(4), 251-277.
- Prahalad, C. K. & Hamel, G. (1990). Core competency concept. *Harvard Business Review*, 64(3), 70-92.
- Preisendörfer, P., Bitz, A., & Bezuidenhout, F. J. (2012). Business start-ups and their prospects of success in South African townships. *South African Review of Sociology*, 43(3), 3–23.
- Rammer, C., Czarnitzki, D., & Spielkamp, A. (2009). Innovation success of non-R&D-performers: substituting technology by management in SMEs. *Small Business Economics*, 33(1), 35-58.

- Randøy, T., & Goel, S. (2003). Ownership structure, founder leadership, and performance in Norwegian SMEs: implications for financing entrepreneurial opportunities. *Journal of Business Venturing*, 18(5), 619-637.
- Rezaei, J., & Ortt, R. (2018). Entrepreneurial orientation and firm performance: the mediating role of functional performances. *Management Research Review*, 41(7), 878-900.
- Roodman, D. (2009). How to do xtabond2: An introduction to. Difference” and “System” GMM in Stata.” Working Paper, 103.
- Saeed, A., & Ziaulhaq, H. M. (2019). The Impact of CEO Characteristics on the Internationalization of SMEs: Evidence from the UK. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 36(3), 322-335.
- Sapra, H., Subramanian, A., & Subramanian, K. V. (2014). Corporate governance and innovation: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 49(4), 957-1003.
- Schilling, M. A., & Phelps, C. C. (2007). Interfirm collaboration networks: The impact of large-scale network structure on firm innovation. *Management science*, 53(7), 1113-1126.
- Schuster, C. L., Nicolai, A. T., & Covin, J. G. (2018). Are Founder-Led Firms Less Susceptible to Managerial Myopia? *Entrepreneurship Theory and Practice*, 1042258718806627.
- Sciascia, S., Mazzola, P., Astrachan, J. H., & Pieper, T. M. (2013). Family involvement in the board of directors: Effects on sales internationalization. *Journal of Small Business Management*, 51(1), 83-99.
- Sciascia, S., Nordqvist, M., Mazzola, P., & De Massis, A. (2015). Family Ownership and R&D Intensity in Small and Medium Sized Firms. *Journal Product Innovation Management*, 349-360.
- Serrasqueiro, Z., & Macas Nunes, P. (2012). Is Age a Determinant of SMEs' Financing Decisions? Empirical Evidence Using Panel Data Models. *Entrepreneurship Theory and Practice*, 36, 627-654
- Shaikh, I. A., O'Brien, J. P., & Peters, L. (2018). Inside directors and the underinvestment of financial slack towards R&D-intensity in high-technology firms. *Journal of Business Research*, 82, 192-201.
- Shaikh, I. A., & Peters, L. (2018). The value of board monitoring in promoting R&D: a test of agency-theory in the US context. *Journal of Management and Governance*, 22(2), 339-363.
- Shapiro, D., Tang, T., Wang, M., & Zhang, W. (2015). The effects of corporate governance and ownership on the innovation performance of Chinese SMEs. *Journal of Chinese Economic and Business Studies*, 13, 311-335.
- Shi, H., Xu, H. & Zhang, X. (2018). Do politically connected independent directors create or destroy value? *Journal of Business Research*, 83, 82-96.
- Simsek, Z., Heavey, C., & Veiga, J. J. F. (2010). The impact of CEO core self-evaluation on the firm's entrepreneurial orientation. *Strategic Management Journal*, 31(1), 110-119.
- Simsek, Z., Lubatkin, M. H., & Floyd, S. W. (2003). Inter-firm networks and entrepreneurial behavior: A structural embeddedness perspective. *Journal of Management*, 29(3), 427-442.
- Smith, K. G., & Cao, Q. (2007). An entrepreneurial perspective on the firm-environment relationship. *Strategic Entrepreneurship Journal*, 1(3-4), 329-344.
- Sørensen, J., & Stuart, T. (2000). Aging, obsolescence, and organizational innovation. *Administrative Science Quarterly*.
- Stenholm, P. (2011). Innovative Behavior as a Moderator of Growth Intentions; *Journal of Small Business Management* Volume 49, 233-251
- Tan, J., Fischer, E., Mitchell, R., & Phan, P. (2009). At the center of the action: Innovation and technology strategy research in the small business setting. *Journal of Small Business Management*, 47(3), 233-262.
- Theriou, G. & Chatzoudes, D. (2013). Exploring the entrepreneurship-performance relationship: evidence from Greek SMEs. *Journal of Small Business and Enterprise Development*, 22, 2, 352-375.
- Tihanyi, L., Ellstrand, A. E., Daily, C. M., & Dalton, D. R. (2000). Composition of the top management team and firm international diversification. *Journal of management*, 26(6), 1157-1177.
- Tribo, J., Berrone, P. & Surroca, J. (2007). Do the type and number of blockholders influence R&D investments? New evidence from Spain. *Corporate Governance: An International Review*, 15, 828-842.
- Tsai, K. H. & Wang, J. C. (2004). The R&D performance in Taiwan's electronics industry: a longitudinal examination. *R&D Management*, 34(2), 179-189.
- Tzabbar, D. & Margolis, J. (2017). Beyond the Startup Stage: The Founding Team's Human Capital, New Venture's Stage of Life, Founder-CEO Duality, and Breakthrough Innovation. *Organization Science* 28(5), 857-872.
- Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, 71, 69-78.
- Van Gils, A., Voordeckers, W., & van den Heuvel, J. (2004). Environmental uncertainty and strategic behavior in Belgian family firms. *European Management Journal*, 22(5), 588-595.
- Wang, T., & Song, M. (2016). Are Founder Directors Detrimental to New Ventures at Initial Public Offering? *Journal of Management*, 42, 644-670.

- Wasserman, N. (2017). The throne vs. the kingdom: Founder control and value creation in startups. *Strategic Management Journal*, 38(2), 255-277.
- Wasserman, N. (2006). Stewards, agents, and the founder discount: Executive compensation in new ventures. *Academy of Management Journal*, 49: 960-976.
- Wiklund, J., Patzelt, H., & Shepherd, D. A. (2009). Building an integrative model of small business growth. *Small Business Economics*, 351-374.
- Wiklund, J., & Shepherd, D. A. (2005). Entrepreneurial orientation and small business performance: a configurational approach. *Journal of Business Venturing*, 71-91.
- Wincent, J., Anokhin, S., & Örtqvista, D. (2010). Does network board capital matter? A study of innovative performance in strategic SME networks. *Journal of Business Research*, 63, 265-275.
- Xie, X., & O'Neil, H. (2013). Boards as resource providers and monitors for research and development. *Journal of Business Strategies*, 30 (2), 180-204.
- Yoo, T. & Sung, T. (2015). How outside directors facilitate corporate R&D investment? Evidence from large Korean firms, *Journal of Business Research*, 68, 1251-1260.
- Zahra, S. (1996). Governance, ownership, and corporate entrepreneurship: The moderating impact of industrial technological opportunities. *Academy of Management Journal*, 39(6), 1713–1735.
- Zahra, S. A. (2007). Contextualizing theory building in entrepreneurship research. *Journal of Business venturing*, 22(3), 443-452.
- Zahra, S. A., & Filatotchev, I. (2004). Governance of the entrepreneurial threshold firm: A knowledge-based perspective. *Journal of Management studies*, 41(5), 885-897.
- Zahra, S. A., Neubaum, D. O., and Naldi, L. (2007). The effects of ownership and governance on SMEs' international knowledge-based resources. *Small Business Economics*, 29(3), 309-327.
- Zahra, S., Neubaum, D. O., & Huse, M. (2000). Entrepreneurship in medium-size companies: exploring the effects of ownership and governance systems. *Journal of Management*, 26(5), 947–976.
- Zona, F., Zattoni, A., & Minichilli, A. (2013). A contingency model of boards of directors and firm innovation: The moderating role of firm size. *British Journal of Management*, 24(3), 299-315.

**Table 1. Boards and Innovation (R&D)**

PAPERS	THEORIES	VARIABLES	SAMPLE	MAIN RESULTS
Arzubiaga <i>et al.</i> (2018a) (Journal of Business Venturing)	Stewardship and Resource Dependence	Family director ratio; Family ownership; Family/non-family CEO	230 Spanish family (SMEs)	i) Family involvement in the BoD hinders the ability of family SMEs to turn EO into innovations. ii) The quality of the directors' knowledge, competences, and skills is an important condition for family SMEs' ability to obtain innovation.
Arzubiaga <i>et al.</i> (2018b) (International Entrepreneurships and Manag. Journal)	Socioemotional Wealth (SEW) Resource-Based View (RBV)	Family director ratio Female director ratio Strategic involvement of the board of directors	230 Spanish family (SMEs)	Family and female involvement in boards meaningfully affects the EO–firm performance relationship in family SMEs.
Ashwin, Krishnan & George (2016)	Resource Dependence Agency	Independent directors Board size Interlocks	172 firms in the Indian pharmaceutical industry	There is a positive interaction effect of independent director ratio and financial slack on R&D investments.
Barker & Muller, (2002)	Upper-echelon	CEO characteristics (tenure, age, experience)	172 firms (Business Week 1,000 lists)	R&D spending varies with the characteristics of CEOs.
Baysinger, Kosnik & Turk (1991)	Agency	Stock concentration Inside directors	176 Fortune 500 companies	i) Positive relationship between the percentage of inside directors and R&D spending. ii) Positive effect of stock concentration on R&D spending can be attributed to institutional investors.
Belloc, Laurenza & Rossi (2016)	Agency Shareholder approach versus stakeholders approach	Ownership concentration Owner's identity	Italian manufacturing corporations for the 2002–2007 period	Higher ownership concentration tends to reduce agency costs when asset specificity is extremely low.
Block (2012)	Agency	Lone founder ownership Family-owned firms	Panel dataset of large U.S. firms (154 firms)	Family ownership decreases the level of R&D intensity, ownership by lone founders has a positive effect on R&D intensity.
Chang, Wu & Wong (2010)	Agency, Altruism	Family control, Institutional ownership	181 firms (Taiwan)	Firms with boards closely linked to controlling families were associated with greater agency costs.
Chen & Hsu (2009)	Agency	Family ownership, CEO duality.	369 electronic Taiwan Stock Exchange (Family Firms)	i) Negative relationship between family ownership and R&D investment. ii) High level of board independence can serve as an effective governance, which in turn may reduce investment risks.
Chen, Tsao & Chen (2013)	Family Firms Literature	Family firm, Growth, Size, Age	2548 firms-years from Taiwan Stock Exchange	Level of R&D investment are higher in family firms than non-family firms.
Cho & Kim (2017)	Labor market Legacy conservation	CEO career horizon	ExecuComp database (1992-2001)	A firm whose CEO has a short career horizon tends to produce fewer break-through innovations, and that this relationship is partially mediated by the level of R & D spending.
Dalziel, Gentry & Bowerman (2011)	Agency; Resource Dependence Corporate Entrepreneurship	Financial Experience, Technical Experience, Education Level, Interlocks	225 biotechnology and pharmaceutical firms	Aspects of directors' human and relational capital influence R&D spending.
De Cleyn & Braet (2012)	Corporate Governance	Board Size, Inside Directors, Interlocks and Shareholder type	49 SMEs in the Belgian manufacturing industries	Significant positive relationship between innovativeness and the size of a firm's board.
Deutsch (2005)	Agency	R&D expenditure, Outside director	Meta- analyses	Negative relationship between the percentage of outside directors and a firm's R&D expenditure.
Deutsch (2007)	Agency	Outside directors' stock-option compensation, Outsider's ratio	S&P 1500	Including stock options in outside directors' compensation enhances firms' R&D.
Duran <i>et al.</i> , (2016)	Family Firms Literature	CEO, Founder CEO, Family CEO	Meta-analysis	i) While family firms invest significantly less in innovation than non-family firms, their innovation output is higher. ii) when the founder leads the firm innovation input is increased while, contrary innovation output is decreased.
Gao & Hafsi (2015)	Upper-echelon	Owner (education; technology-related working experience; political connections)	2,124 private SMEs (China)	Relationship between owners' perceptions of the value of R&D, their education and technology-related experience and R&D spending.

Guldiken & Darendeli (2016)	Resource Dependence Agency	Board tenure of outside directors; Directors' equity (stock) holdings	100 publicly traded large firms from high technology industries	Inverted U-shaped relationship between board monitoring and R&D investment.
Hernández & Camelo & Valle (2010)	Agency Theory Stewardship Theory	R&D investments; executive members; affiliated members; Executives' stock ownership	86 Spanish quoted companies	i) Increased representation of executive members on the board will be negatively associated with a firm's R&D investments. ii) Affiliated directors exerting a positive influence on R&D investments. iii) Affiliated directors' stock ownership will positively moderate the positive association between affiliated directors' representation on the board and a firm's R&D investments.
Hernández, Camelo & Valle (2014)	Agency; Stewardship; Resource Dependence	Composite index innovation indicators	Spanish-quoted companies in technology industries	Innovation increases in firms whose boards have a high proportion of affiliated directors with significant stock ownership.
Kato, Okamuro & Honjo (2015)	Human Capital	Founder (educational background; experience of innovations; age)	389 firms in the Japanese manufacturing and software industries	Certain types of founding members' human capital are directly associated with innovation outcomes.
Kor (2006)	Upper-echelons, resource-based Agency	CEO duality, Outsider's ratio	Technology-based entrepreneurial firms (77 firms, USA)	i) The separation of CEO and chair duties is positively related to R&D investment intensity. ii) The ratio of outsiders on the board has no significant association with R&D investment intensity.
Lee & O'Neil (2003)	Agency Stewardship	Stock concentration	All publicly traded US and Japanese firms in 1995	The influence of ownership concentration on the R&D-to-sales ratio varies between countries.
Lee (2005)	Agency	Stock concentration Interaction of stock	All publicly traded US and Japanese firms in 1995	Non-linear relationship between stock concentration and R&D.
Ojok & Okema (2016).	Agency, Resource Dependence, Stakeholder Stewardship	Board tenure, board interlock, independent directors, and ownership of shares.	68 companies extracted from listed firms in Stockholm Stock Market.	Board interlock has negative effect on R&D spending.
Ortega-Argiles, Moreno & Suriñach (2005)	Agency Managerial company Transaction cost	Percentage of owners or family members in management positions	Panel of companies representing manufacturing industries in Spain (ESEE)	i) The greater the concentration of capital in the hands of few people, the higher the probability of incurring R&D costs; ii) Increase in the participation of owners in management positions will lower the probability both of adopting R&D projects and formalising the result of innovation in the Register of patents and utility models.
Osma (2008)	Agency	Board independence	3,438 firm-years that spans 29 different industries (UK)	Board independence reduces the probability that a firm will cut R&D spending.
Sciascia, Nordqvist, Mazzola & De Massis, A. (2015).	Behavioral agency model	Family ownership; overlap between family wealth and firm equity	240 Italian (SMEs)	The degree of family ownership negatively affects R&D intensity when the amount of family wealth invested in the SME is high.
Shaikh, O'Brien & Peters (2018)	Agency	Inside directors	257 firms in R&D intensive industries from 1997 to 2007 (S&P-1500)	Firms with many inside directors have a consistently higher R&D-intensity than firms with few inside directors.
Shaikh & Peters (2018)	Agency	CEO duality, Outsider's ratio	503 US-firms from a cross-section of industries (S&P 1500 US-firms)	Outsiders, CEO-duality and Growth Prospects are not significant when entered individually
Shapiro, Tang, Wang & Zhang (2015)	Agency	Ownership concentration Independent directors Outside CEO	370 mostly private and relatively small firms China	Ownership concentration has a positive impact on innovation and independent and the presence of an outside CEO positively affect invention patents.
Tribo, Berrone & Surroca, (2007)	Agency	Owners (bank, non-financial corporations, individual) Blockholders	3,638 Spanish firms	i) The impact of large shareholders on the R&D investment is (1) negative when blockholders are banks, (2) positive when blockholders are non-financial corporations and (3) null when blockholders are individuals. ii) Negative relationship between the number of blockholders and R&D investment.

Xie & O'Neil, H. (2013)	Resource Dependence Agency	Board diversity, Outsider ratio	Firms in research intensive industries (108 firms)	The ratio of outsiders will have an indirect impact on firm innovation.
Yoo & Sung (2015)	Agency	Outside director, Family control, Discrepancy between share ownership and decision control	100 large non-financial firms listed on the Korean stock market.	Outside directors are negatively related to R&D intensity and when a firm's growth opportunity is low, the positive effects of family control on R&D investment are stronger.
Zahra, Neubaum & Huse, (2000).	Agency	Executive ownership, Outsider ratio, CEO & chair separation	239 medium-size manufacturing companies (US).	i) Executive ownership is positively associated with Corporate entrepreneurship (CE). ii) Negative associations between outsider representation and CE.

**Table 2: Descriptive statistics**

	Obs.	Mean	SD	Min	Max	VIF
R&D Ratio	195	3.3822	13.7544	0	140.6569	
Founder CEO	184	-	-	0	1	2.02
Founder-board memberratio	176	19.7980	16.1950	0	100	2.24
Duality	176	-	-	0	1	1.94
Tenure	187	4.1912	2.6593	1	18	1.52
Outside director ratio	187	21.2529	16.0298	0	60	1.38
Inside director ratio	187	30.1263	18.0451	0	100	1.73
Number of years on MAB	191	3.4817	2.1517	0	9	1.28
Board size	187	7.2995	2.7310	2	18	1.62
Firm size	223	15.7365	1.6903	9.0618	19.0229	1.84
Firm Age	285	11.2947	7.2460	1	33	1.71



**Table 3: Correlation matrix**

	1	2	3	4	5	6	7	8	9	10	11
1 R&D Ratio	1										
2 Founder CEO	0.0228	1									
3 Founder-board member ratio	0.1379	0.3639*	1								
4 Duality	0.0343	0.2197*	-0.0352	1							
5 Tenure	0.0280	0.2130*	0.0230	0.1521*	1						
6 Inside director ratio	-0.0899	0.4077*	-0.1792*	0.1667*	-0.1818*	1					
7 Outside director ratio	0.0010	0.0887	0.0073	0.1648*	0.1884*	-0.2784*	1				
8 Number of years on MAB	0.0531	-0.1483*	0.1269	-0.0227	0.2423*	-0.1114	-0.1166	1			
9 Board size	-0.0609	-0.5277*	-0.0850	-0.1741*	-0.0956	-0.3843*	-0.0013	0.0461	1		
10 Firm size	-0.5525*	-0.4278*	0.2696*	0.1226	0.1402	0.0168	0.0847	0.2548*	0.1463*	1	
11 Firm age	-0.2177*	-0.3321*	0.0777	0.0041	0.3413*	-0.0319	0.1402	0.2732*	0.2463*	0.5292*	1

\*p&lt;0.05

**Table 4: Results of dynamic panel data regression analysis using System GMM**

	<b>Base Model</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>R&amp;D Ratio (t-1)</b>	0.4803*** (0.0376)	0.4312*** (0.0577)	0.3193*** (0.0530)	0.8230*** (0.1270)
<b>Founder CEO</b>		-4.4797*** (0.9695)	-5.2939*** (1.4837)	2.1115 (2.1081)
<b>Founding board member ratio</b>			-0.4234*** (0.0960)	-1.1943* (0.4713)
<b>Founding board member ratio<sup>2</sup></b>			0.0028* (0.0012)	0.0106* (0.0051)
<b>Firm age x Founding board member ratio</b>				0.0808** (0.0277)
<b>Firm age x Founding board<sup>2</sup> member ratio</b>				-0.0009* (0.0277)
<b>Duality</b>	-0.1074 (0.7010)	2.4941* (0.9756)	5.4240*** (1.5870)	-1.1998 (1.9459)
<b>Tenure</b>	0.3489 (0.3389)	1.1454* (0.4606)	2.2735*** (0.2320)	-0.1957 (0.4812)
<b>Ratio of outside directors</b>	0.0599* (0.0238)	0.04179** (0.0152)	-0.0293 (0.0583)	0.0157 (0.0901)
<b>Ratio of inside directors</b>	-0.0162 (0.0265)	-0.0524* (0.0224)	-0.0785** (0.0251)	-0.0035 (0.0318)
<b>Number of years listed on MAB</b>	0.2607 (0.1775)	0.7440*** (0.1967)	0.8488* (0.3595)	-0.4115 (0.3927)
<b>Board size</b>	0.1652 (0.0888)	0.1667 (0.1201)	-0.5157** (0.1838)	-0.0561 (0.2459)
<b>Firm size</b>	-1.4874* (0.6043)	-2.9491*** (0.6366)	-5.1497*** (0.8040)	-0.2762 (1.1631)
<b>Firm age</b>	0.0280 (0.0958)	0.0092 (0.1254)	-0.0666 (0.1618)	-1.0462* (0.4183)
<b>Industries 2</b>	3.9774 (3.1838)	0.3646 (2.8048)	-11.3486 (13.9079)	-7.2554 (8.5124)
<b>Industries 3</b>	2.9638 (3.0190)	2.0267 (2.7216)	-9.5281 (13.3810)	-7.6956 (8.2014)
<b>Industries 4</b>	3.0137 (2.9818)	3.3070 (2.9389)	-6.7141 (14.4537)	-10.6610 (8.8158)
<b>Wald Chi<sup>2</sup></b>	292766.36***	128687.46***	615954.60***	300703.61***
<b>Arellano-Bond test for AR(2)</b>	1.17	0.05	-1.48	1.57
<b>Hansen test</b>	19.96	16.78	13.90	7.08

Standard errors in parentheses. \*p<0.05; \*\*p<0.01, \*\*\*p<0.001.

**Table 5: Results of dynamic panel data regression analysis using System GMM**

	<b>Ratio I+D</b>
<b>R&amp;D Ratio (t-1)</b>	0.6540*** (0.1133)
<b>Founder CEO</b>	-5.2183* (2.3981)
<b>CEO-heir</b>	7.4399** (2.5753)
<b>Ratio of founding board members</b>	-1.4207*** (0.3475)
<b>Ratio of founding board members<sup>2</sup></b>	0.0136** (0.0046)
<b>Firm age x Ratio of founding board members</b>	0.1139*** (0.0265)
<b>Firm age x Ratio of founding members<sup>2</sup></b>	-0.0017** (0.0265)
<b>Duality</b>	2.4989 (2.6289)
<b>Tenure</b>	1.0079* (0.4110)
<b>Ratio of outside directors</b>	-0.1317 (0.1014)
<b>Ratio of inside directors</b>	-0.0712 (0.0670)
<b>Number of years listed on the MAB</b>	-0.0400 (0.3755)
<b>Board size</b>	-0.6149 (0.3276)
<b>Firm size</b>	-3.1222** (1.1693)
<b>Firm age</b>	-1.2863*** (0.3004)
<b>Industries 2</b>	-17.8959 (9.5196)
<b>Industries 3</b>	-17.7187 (9.2948)
<b>Industries 4</b>	-17.0701 (9.2850)
<b>Wald Chi<sup>2</sup></b>	25750.31***
<b>Arellano-Bond test for AR(2)</b>	0.72
<b>Hansen test</b>	7.13

Standard errors in parentheses. \*p<0.05; \*\*p<0.01, \*\*\*p<0.001.

Figure 1.- Research model and hypotheses

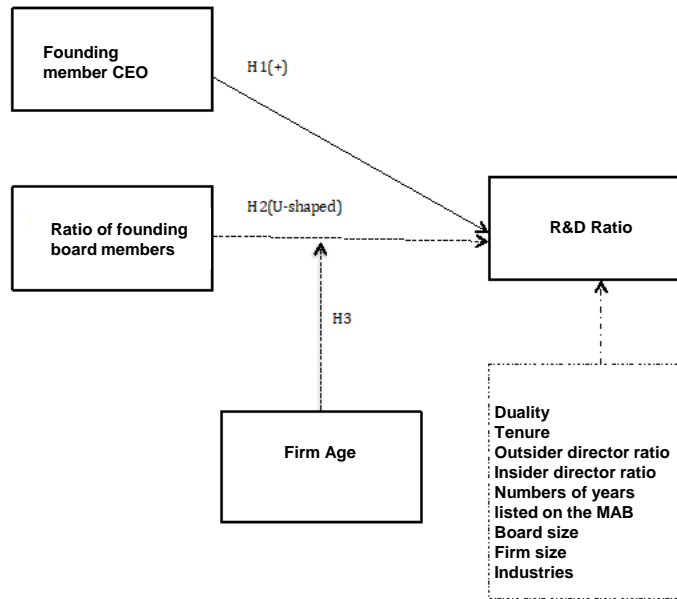


Figure 2: Quadratic relationship between ratio of founding-board members and R&D ratio

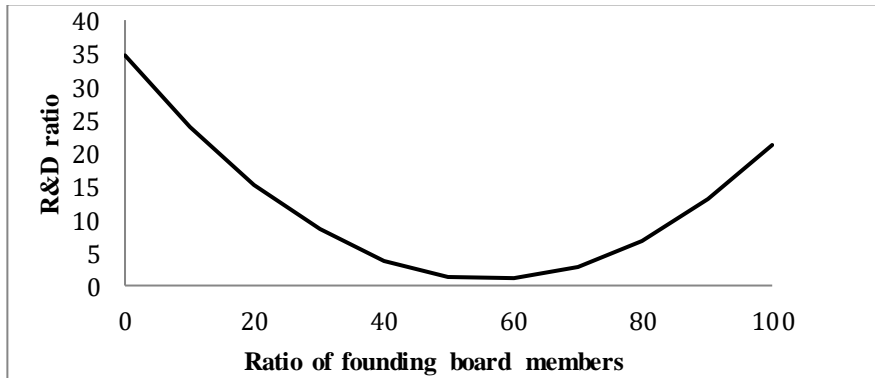


Figure 3: Moderating effect of age in the quadratic relation between the ratio of founding board members and the R&D ratio

