

Top management team heterogeneity and economic performance: a micro-foundations perspective of academic business venturing

Mauro Sciarelli, Giovanni C. Landi, Lorenzo Turriziani and
Anna Prisco

*Department of Economics Management and Institutions,
University of Naples Federico II, Napoli, Italy*

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Abstract

Purpose – This research focuses on the relationship between Top Management Team heterogeneity (TMT) and University Spin-Offs (USOs) economic performance according to a micro-foundational perspective. The purpose consists in exploring whether a high academic representation in TMTs may improve USOs' performance and how their competencies and backgrounds affect USOs' economic success.

Design/methodology/approach – The authors employed data from the Italian platform Netval to identify the entire population of USOs in southern Italy. They selected both pure and hybrid spin-offs that had at least one academic member on the TMT. Applying these conditions to our sample selection, the authors came to a population of 136 firms. They applied a hierarchical regression analysis to test the hypotheses.

Findings – Our main findings reveal that the USOs' economic performance improves with more academicians in the TMT and even in the same scientific field. Our data also shows that CEO duality has a negative impact on economic performance.

Originality/value – This work takes for the first time a micro-foundational perspective to analyze individual-level factors that affect USOs' performance. The authors tried to bridge a research gap in the USO literature, shedding light on the relationship between TMT composition and new venture performance, considering some significant interactions between team members. Our expected findings also contribute to the general literature on entrepreneurial teams in new ventures and suggest a means to reconcile some inconsistent literature results on TMT heterogeneity and USO performance.

Keywords University spin-offs, Top management team, Academic entrepreneurship, University technology transfer, Micro-foundations, Economic performance

Paper type Research paper

1. Introduction

Nowadays, universities are the leading developers of new knowledge and innovation within the socio-economic system (Vesperi and Gagnidze, 2019). One of the most effective mechanisms for the commercial exploitation of research outcomes into new businesses is the creation of University Spin-Offs (USOs). They are peculiar research-based firms emerging from a core technology transfer developed at a public- or university-based research institution (Nicolaou and Birley, 2003; Clarysse *et al.*, 2005). On this ground, they become potential drivers for regional and national development as they can foster economic growth (Di Gregorio and Shane, 2003), create employment in science-based sectors (Clarysse *et al.*, 2005; O'Shea *et al.*, 2008) and bridge industry to science (Debackere and Veugelers, 2005).

Prior literature has focused on several factors affecting USOs' performance, such as the support and scouting activities from the technology transfer offices (TTOs) (Algieri *et al.*, 2013; Lockett *et al.*, 2005), the effect of the composition of the founders (Clarysse and Moray, 2004; Knockaert *et al.*, 2011), the equity owned by the parent university (Colombo *et al.*, 2010) and the



main characteristics of a USO at the initial growth phase (Iacobucci *et al.*, 2011). Even if some researchers (Colombo and Grilli, 2010; Newbert *et al.*, 2008) have considered entrepreneurial capabilities as effective drivers of USOs' economic success, only a few of them have investigated USOs' success starting from the composition of their Top Management Teams (TMTs) (Knockaert *et al.*, 2011; Visintin and Pittino, 2014; Mustar *et al.*, 2006; Prencipe, 2016), adopting the upper echelon theory (Hambrick and Mason, 1984) or the resource-based view (Barney, 2001). Although these studies started opening the "black box," the relationship between TMT heterogeneity and USOs ought to be further investigated.

Drawing from the prior literature, USOs generally show a high representation of academics in their TMTs (Chiesa and Piccaluga, 2000), with a high concentration of research knowledge and a lack of commercial competencies (Franklin *et al.*, 2001; Ensley and Hmieleski, 2005; Wright *et al.*, 2006; Colombo and Piva, 2012; Czarnitzki *et al.*, 2014). On this ground, such ventures often incorporate nonacademic members in their TMTs (Vanaelst *et al.*, 2006), which are also called "surrogate" entrepreneurs (Franklin *et al.*, 2001), to acquire market skills and commercial expertise. However, lines of evidence of the impact of this practice are mixed (Criaco *et al.*, 2014). On the one hand, according to Visintin and Pittino (2014), we may assume that a certain degree of cognitive diversity and market orientation in TMTs should enhance USOs' economic performance. However, other scholars argued for the negative effects of a dual composition, as the involvement of nonacademics in a USO entrepreneurial team may create a "faultline" effect, which divides nonacademics from the academic subgroup, thus compromising TMT integration (Thatcher and Patel, 2012; Visintin and Pittino, 2014; Rasmussen and Wright, 2015; Ben-Hafaïedh *et al.*, 2018).

Nevertheless, while existing research has gone beyond the classical view of team diversity, the issue of how to shape a well-balanced USOs' TMT remains still unclear. According to Ensley and Hmieleski (2005), USOs' TMTs, on average, underperform compared to their independent counterparts, and investors recognize the development of these teams as riskier (Wright *et al.*, 2006). In their wide-ranging review of USOs' TMT heterogeneity, Bunderson and Van der Vegt (2018) argued that extant studies focused mainly on horizontal diversity, i.e. the heterogeneity in demographics and social attributes, while little is known about the impact of vertical differences between team members, which is diversity in status and power (Harrison and Klein, 2007). On this ground, this work tries to shed light on these issues by developing a comprehensive analysis able to integrate both USOs' TMT horizontal and vertical heterogeneity and its effect on the firms' economic performance.

Adopting a micro-foundational approach (Barney and Felin, 2013) by emphasizing the role of companies' individuals, processes, and structures in acquiring internal competencies and competitive advantage (Barney and Felin, 2013) may shed light on the TMT's lower-inner entities affecting USOs' financial performance. Instead, a deeper understanding of this latter effect is important, especially in the case of Italian USOs, very often managed by the academics who founded them (Chiesa and Piccaluga, 2000) – which in turn are characterized by high scientific productivity and low managerial knowledge (Abramo *et al.*, 2012). On this ground, academic entrepreneurship's micro-foundations reside in USOs' TMTs and members' individual attributes (Ben-Hafaïedh *et al.*, 2022; Knockaert *et al.*, 2011; Taheri and van Geenhuizen, 2016) that is "the group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture" (Klotz *et al.*, 2014, p. 227).

Thus, this research aims to fill this gap by focusing on the relationship between TMT heterogeneity and USO economic performance according to a micro-foundational perspective. Our purpose includes exploring if a high representation of academics in TMTs may improve USOs' performance and how their competencies and backgrounds affect USOs' economic success. Additionally, considering the influence of vertical diversity on

firm's performance, we consider both CEO duality (the same person as the CEO and the chairman of the board) and the involvement of women on the board.

We selected from the Netval database (Netval, 2018) all 136 active USOs established in southern Italy. We included pure USOs with only academic founders and hybrid ones with a founding team composed of academics and nonacademics. We focused our study on South Italy, given the harsher environment where spin-offs and small firms face more difficulties (Abramo *et al.*, 2012). Hence, our work tries to offer additional insights into academic entrepreneurship, identifying the individual-level factors in USOs' teams, improving USOs' economic performance, thus stimulating local economic development in a resource-constrained environment such as southern Italy.

We found that USOs' economic performance improves with more academicians in the TMT and even in the same scientific field.

Overall, our findings bolster the assumption that TMT homogeneity preserves tacit skills and group routines that contribute to economic growth by USOs (Clarysse and Moray, 2004; Knockaert *et al.*, 2011; Visintin and Pittino, 2014). Specifically, we contribute to the research on academic start-ups highlighting two main insights into the extant literature on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Bercovitz and Feldman, 2008; Jain *et al.*, 2009; Rothaermel *et al.*, 2007). The first insight concerns the presence of academics in USO's TMT. Contrary to Visintin and Pittino (2014), who asserted that a well-balanced TMT in terms of scientific and business orientation might enhance USO's economic performance, our study shows that USOs should leverage on academic competencies to grow economically (Ferretti *et al.*, 2020). On this ground, according to Wright *et al.* (2012), we recognized that academic knowledge has important implications for local economic competitiveness, as USOs can be potential drivers for regional and national development, fostering economic growth (Di Gregorio and Shane, 2003), creating employment in science-based sectors (Clarysse *et al.*, 2005; O'Shea *et al.*, 2008) and bridging industry to science (Debackere and Veugelers, 2005). Hence, our empirical findings reconcile with studies on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Jain *et al.*, 2009). First, preserving TMT homogeneity in terms of academic composition requires the empowerment of academics' knowledge, emphasizing the role of individual competencies in determining venture performance. Second, exploring USOs' micro-level functioning contributes to understanding key macro-level dynamics, such as TTOs practices in supporting USOs' development (Wright *et al.*, 2012), especially in a resource-constrained environment such as southern Italy (Algieri *et al.*, 2013).

The remainder of this paper is organized as follows: In Section 2, we provide the theoretical framework and research hypotheses; in Section 3, we describe the variables, methods and outcomes of our analysis; in Section 4, we discuss our empirical findings; in Section 5, we argue some practical implications are coming from our final remarks and finally, in Section 6, we present the main limitations of this work, suggesting opportunities for further research.

2. Theoretical background

2.1 Micro-foundations of academic entrepreneurship

TMT heterogeneity has been recognized as a critical factor for new venture growth (Colombo and Piva, 2012; Wright *et al.*, 2006), especially in small firms such as USOs where solid hierarchical structures do not mediate individual actions. These entities seem to be largely homogeneous in education, industry experience, functional expertise and skills (Lockett *et al.*, 2005; Ensley and Hmieleski, 2005). They have a more significant "knowledge gap" in the multidisciplinary tasks they typically face. However, empirical studies about TMT

composition diversity highlight, to date, ambiguous results as scholars have not yet reached a clear consensus about the optimal team configuration (Klotz *et al.*, 2014), especially concerning newly founded USOs (Nikiforou *et al.*, 2018). Studies affirming the advantages of more homogeneous teams emphasize the performance-enhancing effect associated with the lower impact of cognitive distances and yet, mostly ignore knowledge integration advantages and related problems. Conversely, teams with a high degree of heterogeneity, although more exposed to conflicts that tend to hinder effective internal processes and generate frequent turnovers of members (Vanaelst *et al.*, 2006), might achieve innovative and creative tasks thanks to the integration of different perspectives (Díaz-Fernández *et al.*, 2019). Overall, the positive aspects of a heterogeneous entrepreneurial group include the ability to see more alternatives, evaluate them better and to be able to predict environmental changes more effectively. The negative aspects include slower decision-making, potential communication breakdowns and more interpersonal conflict. Indeed, highly diverse teams run the risk of integration and goal conflicts, pointing at the importance of studying the structure and the dynamics and interactions between USOs' members (Miranda *et al.*, 2017; Mathisen and Rasmussen, 2019; Ben-Hafaiedh *et al.*, 2022).

Research on micro-foundations may clarify these conflicting assumptions, shedding light on internal elements, processes, and individual actions and interactions worthy of further investigation (Barney and Felin, 2013). Accordingly, the micro-foundational approach emphasizes the role of individuals, processes and structures of companies in the acquisition of internal competencies and competitive advantage (Felin and Foss, 2005; Barney and Felin, 2013; Felin *et al.*, 2015; Ahn *et al.*, 2018; Bogers *et al.*, 2018). Thus, "organisational analysis should be fundamentally concerned with how individual-level factors aggregate to the collective level" (Barney and Felin, 2013, p. 145). Micro-foundation research focuses on individual actions and interactions on firm heterogeneity (Felin *et al.*, 2012).

In the context of USOs, the growing emphasis in understanding how individual characteristics can enhance the commercial exploitation of scientific knowledge has prompted an increasing interest in the micro-foundations of academic entrepreneurship with a focus on the lower-inner entities that compose a USO's TMT (Ankrah *et al.*, 2013; Jain *et al.*, 2009). On this ground, Hossinger *et al.* (2020), conducting a systematic literature review on 193 relevant articles, found that individual factors carried significantly higher explanatory power concerning the entrepreneurial behavior of academics in explaining USOs' economic success.

This attention comes in part from the complex challenges faced by academics; they have to integrate different and conflicting norms, skills and priorities in managing USOs (Sauermaun and Stephan, 2013). Indeed, while the open science norms help publish and disseminate findings, the past decade has shown a remarkable change in the disposition of universities toward the commercialization of research results (Owen-Smith, 2005).

Adopting the micro-foundational approach to academic entrepreneurship, several scholars (Clarysse *et al.*, 2011; Fini *et al.*, 2012; Goethner *et al.*, 2012) revealed the importance of individuals in explaining the economic success of new business ventures. On this ground, to understand the critical determinants of USOs' financial performance, we should consider their inner-micro entities, such as individuals or subgroups, and the interactions between them (Wright *et al.*, 2012).

Accordingly, we analyzed TMT heterogeneity both from horizontal and vertical perspectives, focusing on factors considered by prior literature as possible drivers of competitive advantage from a micro-foundational perspective. Therefore, our micro-level study focuses on the academic composition, academic scientific background, interlocking directorates, and some aspects related to governance issues, such as CEO duality and female involvement.

2.2 Academic composition and USO's performance

Several researchers (Vohora *et al.*, 2004; Clarysse and Moray, 2004) highlighted that USOs' members usually belong to a nonmarket-based environment where scientific knowledge is more relevant than business expertise (Visintin and Pittino, 2014). Indeed, academic entrepreneurs focus mainly on highly innovative products and services, allowing USOs to create a new market where entrepreneurs can benefit from a first-mover advantage (Heirman and Clarysse, 2004). At the same time, academicians are usually unfamiliar with the business environment as their competencies are more focused on science education and research (Colombo and Piva, 2012). They also tend to preserve their own rules and identities, inhibiting spin-off development (Clarysse and Moray, 2004). Moreover, their commitment to science may conflict with their entrepreneurial vision (Jain *et al.*, 2009), significantly when research and venture interests diverge (Visintin and Pittino, 2014). Some scholars thus posit that the involvement of professional managers or "surrogate entrepreneurs" can enhance spin-off development to provide leadership, business experience and market connections (Clarysse and Moray, 2004; Lundqvist, 2014; Migliori *et al.*, 2019). Therefore, USOs often engage external actors in the top management to acquire additional managerial resources, competencies and capabilities (Clarysse and Moray, 2004; Mustar *et al.*, 2006; Colombo and Piva, 2012; Visintin and Pittino, 2014). On this ground, USOs' efforts should focus on building balanced TMTs in terms of scientific and business orientation (Visintin and Pittino, 2014). In this vein, the inclusion of outside professionals from nonuniversity environments could be particularly beneficial for USOs through improvements to the team's professionalism and cognitive diversity (Diáñez-González and Camelo-Ordaz, 2016).

On the other side, according to the micro-foundational approach, involving nonacademic members within USOs' TMTs may drive members to divide into subgroups or even factions (Li and Hambrick, 2005).

Indeed, academic and nonacademic managers may exhibit significant differences in culture, goals, business orientation and expectations (Vohora *et al.*, 2004). For example, the full-time commitment of nonacademic personnel, compared with the part-time availability of academic members, can result in internal conflicts, leading to mistrust among members and undermining the entrepreneurial team. It may allow dysfunctional conflicts within management teams to emerge, leading to interpersonal incompatibilities and a worse economic performance (Visintin and Pittino, 2014; De Nicola *et al.*, 2019).

Conversely, a high percentage of academics in a USO's TMT can foster members' integration and engender better performance (Clarysse and Moray, 2004; Knockaert *et al.*, 2011), as academic members tend to maintain the same composition of the preexisting research team (Williams and O'Reilly, 1998). Other studies (Ferretti *et al.*, 2020) argued that academics in USOs' TMTs contribute to creating a positive image of the USO since it implies that the managerial board has scientific knowledge, essential in managing a science-based venture, whose core business often belongs to a scientific domain. Specifically, Bonardo *et al.* (2011) found that, on average, a higher academic representation in USOs' TMTs is perceived as beneficial by investors especially in the early period following IPOs. Moreover, Murray (1989) demonstrated that academic members can play a central role in bridging USOs to external scientific networks. On the same page, Clarysse and Moray (2004) suggested that academic subgroup's research experience can positively impact on the growth of these research-based start-ups. Contrariwise, Scholten *et al.* (2015) did not find significant evidence of a relation between USOs' TMTs' research experience and their financial performance. However, the presence of academics on USOs' TMTs might increase the effective exploitation of scientific tacit knowledge, which represents a critical and not coded resource for firms founded by academics (Agarwal and Shah, 2014). On this ground, we predict that incorporating external members may cause frictions in a USO's TMT based on the above arguments. It even can increase conflict within a TMT with a negative effect on the USO's

economic performance even if they bring management-related competencies. Therefore, we formulate the following hypothesis as follows:

H1. A high representation of academics in TMTs improves USOs' economic performance.

2.3 Scientific background heterogeneity and USO's performance

TMT literature pointed out the positive impact of many scientific backgrounds on firms' economic performance (Ensley and Hmieleski, 2005; Talke *et al.*, 2011). Indeed, team members with different backgrounds provide a broader range of skills and abilities (Williams and O'Reilly, 1998), improving USO's performance. From another point of view, TMTs with less cognitive variety benefit from the maximal exploitation of shared scientific knowledge (Knockaert *et al.*, 2011) and easier communication throughout inner team processes (Steffens *et al.*, 2012) due to the lack of divergent cognitive frames (Wuyts *et al.*, 2005) and the formation of a shared pattern of organizational rules and routines. USOs show a moderate level of heterogeneity when individuals belong to closely related disciplinary knowledge domains that share several attributes (Tagliazucchi *et al.*, 2021). Such a situation, for example, can be hypothesized among teams whose members belong to scientific disciplines with common languages, styles of reasoning, phenomenological interests, problem-solving orientations and reference theories (Cohen and Munshi, 2017). This can also be observed when the USOs' TMTs comprise a group of researchers from the same lab and one member from industry or a managerial field providing market-based knowledge.

According to a micro-foundational approach (Barney and Felin, 2013), high background diversity in a USO's TMT could promote debate among members and synthesize diverse perspectives into well-balanced decisions and strategies (Sciascia *et al.*, 2013).

However, some studies have shown that despite its potential benefits, scientific background heterogeneity (SBH) can have nonsignificant (Ensley and Hmieleski, 2005; Visintin and Pittino, 2014) or adverse effects on economic performance (Amason *et al.*, 2006). On this ground, Visintin and Pittino (2010) found that scientific background diversity in a USO's TMT was negatively related to employment growth. They also recognized that similarities in the scientific background could foster team integration. In addition, several scholars highlighted that homogeneity in academics' scientific knowledge may enhance members' cooperation in a USO's TMT (Williams and O'Reilly, 1998) with the development of shared norms (Beckman *et al.*, 2007) or "mindsets" (Knockaert *et al.*, 2011). Indeed, homogeneity along these traits improves communication among members, promoting mutual monitoring and establishing a wide range of internal routines.

Overall, high levels of internal background heterogeneity could activate potential internal conflicts that hamper shared norms and strategies (Li and Li, 2009).

Accordingly, we tested the following hypothesis:

H2. Homogeneity in TMT scientific backgrounds positively affects USOs' economic performance.

2.4 Interlocking directors and USO's performance

According to a micro-foundational approach, being highly embedded in an external network can benefit USOs' survival and growth (Rasmussen *et al.*, 2011, 2015). As USOs are resource-constrained entities, some scholars (West *et al.*, 2014) found that members' external relationships help them obtain additional knowledge, especially in highly dynamic contexts (Ahn *et al.*, 2018; Bogers *et al.*, 2018).

On this ground, the directors form the connections between boards, creating networks crucial for information exchange, diffusion of management and governance practices, and

starting collaborative projects (Cohen *et al.*, 2008). Overall, interlocked directors play an important role in securing external resources through their linkages to the external environment (Filatotchev and Toms, 2003), counteracting environmental uncertainty (Pfeffer, 1972) and reducing transaction costs associated with environmental interdependence.

Mosey and Wright (2007) argued that USOs leverage their connected networks, especially when TMT members lack a suitable combination of skills, knowledge and business expertise. On this ground, USOs' networks become crucial for strategic knowledge transfers between organizations (Davis *et al.*, 2003) and the rise of interorganizational alliances, which can enhance a USO's economic success. Accordingly, we tested the following hypothesis:

H3. The presence of interlocking directors in TMTs positively affects USOs' economic performance.

2.5 CEO duality and USO's performance

Academic members typically belong to a nonmarket-based environment where technical skills are more relevant than business experience (Visintin and Pittino, 2014), though in USOs' context financial and managerial resources are often needed to turn a promising technology into a successful business. However, obtaining resources and competencies in USOs' TMT is very complex because of high levels of uncertainty regarding the technology, organizational issues, levels of commitment and the markets (Clarysse and Moray, 2004). The effect of this configuration has been studied according to two main incompatible approaches (Prencipe, 2016): on one side some studies analyze it from the Agency Theory, on the other one, some researchers have studied it with the Stewardship Theory. Recent research (Knockaert *et al.*, 2011) has revealed the need to study agency problems even in SMEs such as USOs. On this ground, corporate governance in this type of venture is strongly affected by the conflict between academic and nonacademic members (Parente *et al.*, 2011). Problems arise when, for example, the founder is a scientist with scant entrepreneurial skills and knowledge. In such cases, external managers can be exposed to high risk and information asymmetry levels and are often discouraged from spending time and effort in such new ventures. As in Italian SMEs, USOs typically show a high degree of ownership concentration with a dual CEO – i.e. the practice of a single individual serving as both CEO and board chair (Krause *et al.*, 2014). These characteristics require extensive knowledge to shape efficient and flexible decision-making processes, considering the actual challenges of enterprises (Di Berardino, 2016).

The literature is inconclusive on the benefits and disadvantages of merging both functions in one person (Prencipe, 2016). According to agency theorists, even in small firms, the chairperson and chief executive officer should not be the same. Such overlap may lead to an imbalance of power between the academic and nonacademic subgroups (Tang, 2017), a less independent board (Duru *et al.*, 2016), as well as a lower efficiency in supervising managers' activities (Pugliese and Wenstop, 2007). Instead, independent directors may lead to fair decision-making between the CEO and the chairman, enhancing firms' performance (Rashid and Lodh, 2011). Furthermore, Anderson and Anthony (1986) argued that no duality is helpful to reinforce command and mitigate ambiguity about crucial responsibilities.

According to the Stewardship Theory, CEO duality could facilitate effective decision-making, as it establishes clear lines of authority and responsibility within a firm (Anderson and Anthony, 1986). In addition, Pfeffer and Salancik (1978) emphasized that the increased discretion achieved with dual leadership enhances the CEO's ability to react more quickly and respond in a dynamic business environment and secure resources critical to the firm's success. Furthermore, in the presence of resource constraints, Boyd (1995) highlighted that CEO duality provides leverage to involve outside managers and increase the presence of

women on the board of directors to improve stakeholder relations, decision-making and integration of entrepreneurial members.

Since it is still a little-explored aspect in the USOs' context, we only want to verify the impact of the CEO duality on USOs' economic performance:

H4. CEO duality affects USOs' economic performance.

2.6 Female involvement and USO's performance

Several studies linked the presence of women on the TMT to better financial performance, such as that of [Shrader et al. \(1997\)](#) on the performance of 200 Fortune 500 firms and that of [Carter et al. \(2003\)](#) on 797 Fortune 1,000 firms. Moreover, gender diversity allows decision-makers to exploit undervalued talent pools, improve problem-solving, achieve innovative organizational models ([Cox, 2001](#)) and drive senior managers to understand inclusive decision-making processes open to various viewpoints ([Wei and Wu, 2013](#)). Female managers tend to have higher university education and greater marketing and sales competence ([Groysberg and Bell, 2013](#)); consequently, heterogeneous boards should meet market opportunities through more innovative solutions. Finally, women directors are usually more change-oriented and less risk-averse. Their strategic approach seems to be more sustainable and characterized by a lower failure rate of entrepreneurial initiatives ([Charness and Gneezy, 2012](#)).

The topic of gender diversity in USOs has also been studied. [Stephan and El-Ganainy \(2007\)](#) linked the gender gap in academic businesses to the low presence of women in critical university positions where innovative ideas are usually deployed, consequently implying a gendered academic entrepreneurship ([Langowitz et al., 2005](#)).

The university context is ambiguous on support for women ([Dahlstrand and Politis, 2013](#)). On the one hand, women are generally underrepresented in senior positions ([Rosa and Dawson, 2006](#)); on the other hand, universities also offer great opportunities for education and learning that can empower women to start and develop businesses ([Wilson et al., 2007](#)). Thus, the university environment provides interesting scenarios related to women's academic entrepreneurship, which merits further study. Accordingly, we tested the following hypothesis:

H5. Female involvement in TMTs positively affects USOs' economic performance.

3. Empirical study

3.1 Sample and data

We used data from the Netval directory to identify the entire population of active USOs in southern Italy. Several national and international studies have also used the Netval database, which the TTOs constantly update at Italian universities ([Algieri et al., 2013](#); [Ramaciotti and Rizzo, 2015](#)). We focused on the following regions in southern Italy: Abruzzo, Basilicata, Calabria, Campania, Molise and Puglia. We only selected spin-offs with at least one academic member on the TMT and which were started in a university. We excluded spin-offs proposed by public research centers that collaborate with universities. Our goal is to understand the key factors fostering USO economic growth, given that, in this part of Italy, it has been more difficult for intellectual property to become a successful asset ([Algieri et al., 2013](#)). On this ground, a statistical analysis of the territorial distribution of academic spin-offs revealed a large gap between northern and southern Italy ([Abramo et al., 2012](#); [Algieri et al., 2013](#)). Therefore, according to [Parmentola and Ferretti \(2018\)](#), understanding the factors that either stimulate or inhibit the spin-off development process in southern Italy is helpful to explore the lower-inner entities that could affect USOs' performance.

Finally, descriptive information about the attributes of academic members in terms of background and knowledge was assessed by matching different secondary sources. Specifically, we identified the number of academics in USOs' TMTs and their related scientific backgrounds using the CINECA scientific platform, a nonprofit consortium with 70 Italian universities. We checked the university's website where they work to do so for academic members not listed in the CINECA platform, such as PhD students and research fellows.

Applying these conditions to our sample selection, we came to a population of 136 firms established from 1996 to 2017. Our research goal is to investigate the impact of certain entrepreneurial and managerial factors on USOs' economic performance. To that end, we collected data on each spin-off's governance and financial health from AIDA-Bureau Van Dijk, a financial and accounting information database on Italian companies.

3.2 Variables

In selecting variables, we adopted the following approach. First, we employed some control variables to assess the effect of some relevant contextual dimensions. Specifically, we included variables regarding the parent university to evaluate the impact of external dimensions on USOs' economic performance. We also adopted additional control variables regarding USOs' features to improve the reliability of our analysis, focusing on factors that could reasonably affect variability in the dependent variable. Finally, we included a set of variables that operationalize our theoretical constructs in terms of individual-level characteristics.

3.2.1 Dependent variables. Prior literature pays particular attention to the measurement of USOs' economic performance, playing a key role in the studies on USOs' processes, as they constitute the essential elements for evaluating the degree of effectiveness and efficiency of activities related to university entrepreneurship and technology transfer processes (Colombo *et al.*, 2010; Bigliardi *et al.*, 2013; Hesse and Sternberg, 2017).

We measured USOs' economic performance in terms of return on investment (ROI), calculated as the ratio between operating profit and net operating invested capital. Several studies in the entrepreneurial team literature have used this measurement to evaluate the firm's financial efficiency (Krishnan *et al.*, 1997; Iaquinto and Fredrickson, 1997; Keck, 1997). With specific reference to the USOs' context, this type of measurement is generally accepted and used in studies relating to the growth of small and medium-sized enterprises (Serrasqueiro *et al.*, 2010) as well as in those aimed at performance evaluation of USOs (Walter *et al.*, 2006; Ortin-Angel and Vendrell-Herrero, 2014).

3.2.2 Independent variables. *Academic index (A_INDEX).* In assessing the academics' involvement in USOs' TMTs, we calculated the ratio between academic members and the total number of members.

Scientific background heterogeneity (SBH). We categorized the scientific fields of academic managers according to the Italian University Council (Consorzio Universitario Nazionale_CUN) classification, which consists of 14 areas. SBH was measured within the subgroups of academics by computing the Blau Index (Visintin and Pittino, 2014; Tagliazucchi *et al.*, 2021). In line with Bell *et al.* (2011), who asserted that diversity in TMT may improve team performance by enhancing the pool of competencies and knowledge that can be applied to diverse tasks, we employed the variety conceptualization of diversity as the most suitable to detect the knowledge background and informational specialization of the academic members (Kearney *et al.*, 2009).

Consequently, we employed the Blau index since it is the most used variety index (Budescu and Budescu, 2012; Harrison and Klein, 2007).

CEO duality (CEO_DUA). To evaluate the effect of CEO duality on economic performance, we identified all USOs in southern Italy in which the chairperson holds the CEO position

simultaneously, regardless of whether that person is in the academic or nonacademic subgroup. We indicated them using a dummy variable (Prencipe, 2016).

Participation of women in the TMT (FI). We assessed female involvement in a USO's TMT by calculating the percentage of women in a USO's TMT.

Interlocking directors (INT). We assessed the presence of interlocking directors in a USO's TMT using a dummy variable.

Team size (TS) is measured as the total number of entrepreneurial team members. We assume that the team's size influences the innovative activities of the company and its economic performance (Shefer and Frenkel, 2005). It emerged that smaller scale firms are more likely to innovate than larger ones in proportion to the innovative activities undertaken by the firm (Visintin and Pittino, 2010, 2014).

Sectors (HIS). With a dummy variable, we determined whether a USO belongs to a traditional sector (e.g. real estate, agriculture, mechanics, financial advisory) or a highly innovative one (e.g. life science, biotechnology, engineering, ICT, software industry), since technology and market dynamics are likely to influence differently USOs' growth opportunities (Mustar *et al.*, 2006). We assume that highly innovative sectors show high uncertainty in the markets and in the design stages of technologies. Indeed, in these contexts, the development of the technology and the definition of the product or service is sometimes more important than achieving high levels of economic performance (Visintin and Pittino, 2014).

Spin-off Age (AGE) is measured as the number of years since formal establishment. It measures the survival degree of the university start-up over time. The capability to stay on the market can be considered as an indicator of spin-off economic success (Ferri *et al.*, 2019).

Total Assets (TA) are measured as the total amount of assets owned by a USO expressed in logarithmic form.

University size (US). We constructed an ordinal scale ranging from 0 (small university) to 3 (mega university) based on the total number of logged students during the observation period.

Technology Transfer activity (SOP) is measured as the total amount of patents and USOs that the university owns.

3.3 Analysis and discussion of the results

3.3.1 Estimation procedure. We performed a hierarchical regression analysis to test the hypotheses (Cohen *et al.*, 1983). We chose the hierarchical regression method since it allows incremental changes in the model's explanatory power. Model 1 considers the main effects of the external environment. The main effects of USOs' macro-characteristics were entered in Model 2. In Model 3, we tested the significant impact of our research hypotheses.

We computed the variance inflation factor (VIF) for each explanatory variable to check for multicollinearity problems. VIF values, reported in the last column of Table 1, are consistently lower than 10, indicating the absence of significant collinearity problems, as suggested by Neter *et al.* (1996) (see Table 2).

3.3.2 Results. The results of the hierarchical regression model are shown in Table 3. Looking at the effect of the variables on profitability in Model 1, we found that the university size positively impacts USOs' economic performance (US: 0.035; $p < 0.1$), in accordance with Fini *et al.* (2017) who asserted that the higher the number of faculty members and support staff, the higher the likelihood that some research may be effectively transferred to the market.

Model 2 highlights that belonging to a highly innovative sector contributes to lower USOs' economic performance (HIS: -0.064 ; $p < 0.1$), as operating in a dynamic environment typically requires highly uncertain tasks and greater financial investment to develop new

Variables	1	2	3	4	5	6	7	8	9	10	11	VIF
(1) US	1											2.16
(2) SOP	0.66**	1										2.18
(3) TA	0.06	0.13	1									1.19
(4) AGE	-0.25**	-0.08	0.14	1								1.14
(5) TS	0.06	-0.20**	-0.13	-0.01	1							5.29
(6) HIS	-0.24**	-0.29**	-0.17	-0.05	0.05	1						1.17
(7) A_INDEX	-0.12	0.00	-0.04	-0.01	-0.64**	-0.02	1					3.13
(8) SBH	-0.11	-0.33**	-0.22	0.00	0.68**	0.12	-0.11	1				3.21
(9) INT	-0.04	-0.00	0.17	-0.05	0.40**	-0.11	-0.48**	0.15	1			1.48
(10) CEO_DUA	-0.01	0.20**	0.19**	-0.01	-0.61**	-0.02	0.48**	-0.46**	-0.24**	1		1.81
(11) FI	-0.12	-0.05	-0.15	0.07	0.04	0.09	0.01	0.06	-0.15	-0.09	1	1.08

Note(s): For definitions of the variables, see Paragraph 3.2. ** $p < 0.05$

Table 1.
Correlation matrix

Table 2.
Descriptive statistics

Variables	No. of obs	Mean	St. dev	Min	Max
<i>Independent variable</i>					
ROI	130	0.040	0.165	-0.517	0.676
<i>Control variables</i>					
US	136	1.721	1.038	0.00	3.00
SOP	136	48.00	25.89	7.00	89.00
TA	133	4.992	0.621	3.699	6.626
AGE	136	7.699	4.092	1.00	23.00
TS	134	2.754	1.548	1.00	7.00
HIS	136	0.286	0.453	0.00	1.00
<i>TMT variables</i>					
A_INDEX	134	0.710	0.272	0.20	1.00
SBH	134	0.193	0.265	0.00	0.75
INT	133	0.473	0.501	0.00	1.00
CEO_DUA	136	0.308	0.463	0.00	1.00
FI	136	0.194	0.30	0.00	1.00

Table 3.
Hierarchical regression
analysis

Model variables	Model 1 External factors	Model 2 USO's factors	Model 3 Full model
<i>Control variables</i>			
(1) External factors variables			
US	0.0350*	0.0509**	0.0389**
SOP	-0.0004	-0.0006	-0.0002
(2) USO's variables			
TA	-	0.0019	0.0030
AGE	-	-0.0004	4.87535e-05
TS	-	0.0134	0.0236
HIS	-	-0.0649*	-0.0808**
<i>TMT Variables</i>			
A_INDEX (H1)	-	-	0.2255**
SBH (H2)	-	-	-0.1909**
INT (H3)	-	-	-0.0176
CEO_DUA (H4)	-	-	-0.0848**
FI (H5)	-	-	-0.1640***
R^2	0.0336	0.0942	0.2421
R^2_{Adj}	0.0176	0.0457	0.1635
ΔR^2	-	0.0281	0.1178

Note(s): For descriptions of the variables, see Paragraph 3.2. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

scientific concepts and to transform internal technologies and prototypes into viable products or services.

Finally, looking at the overall model, we have found several significant effects. First, the results presented in Model 3 support H1, which predicts a positive impact of a high percentage of academics in a TMT on economic performance (A_INDEX: 0.225; $p < 0.05$), in contrast to the extant literature on surrogate entrepreneurs that improve USO economic performance. Regarding the heterogeneity in the scientific background, we can also support H2, as empirical findings denote a negative association between SBH and USOs' economic performance (SBH: -0.190; $p < 0.1$). On this ground, we can support those streams of literature asserting that homogeneity in cultural and scientific background fosters members'

integration enhancing USO's economic performance. However, we cannot support H3, which predicts that the presence of interlocking directors affects USOs' economic performance. Regarding the CEO duality (H4), we found that it has a significant and negative impact on a USO's performance (CEO_DUA: -0.084 ; $p < 0.05$), confirming the agency theory perspective according to which the same person should not occupy a position as both chairperson and chief executive officer (Pugliese and Wenstøp, 2007). Finally, regarding H5, we detected a negative and significant association between female involvement in TMTs and USOs' economic performance (FI: -0.164 , $p < 0.01$) boasting the assumption that the university environment still appears weak in fostering female participation in new business ventures (Rosa and Dawson, 2006).

The Adj. R^2 reveals that the last model is better than all the previous ones, and it can explain slightly more than 16% of the total variance. This is in line with the aim of the hierarchical approach, showing that individual-level factors in TMT can provide a more comprehensive explanation of USOs' economic performance.

4. Discussion and conclusions

This study contributes to academic entrepreneurship, adopting for the first time a micro-foundational perspective to analyze the individual-level factors that determine USOs' economic success.

Prior literature (Siegel *et al.*, 2007; Colombo *et al.*, 2010) showed that researchers had focused mainly on university or spin-off level economic performance with little analysis of the individual academic entrepreneur or team. In agreement with Wright *et al.* (2012), we argued that USOs' performance should be explained based on their micro-constituents, such as individuals or subgroups. On this ground, we investigated (1) whether a high percentage of academics in a TMT may improve a USO's performance and (2) how individual-level factors such as members' competencies, roles, experiences, and backgrounds impact a USO's performance.

We have found that USOs with high involvement of academics in their TMTs show a better economic performance than those with more outside managers (H1). It supports the idea that diversity may bring dysfunctional conflicts within management teams, leading to interpersonal incompatibilities and poor economic performance (Visintin and Pittino, 2014). Our study supports previous research finding that a high percentage of academics in a USO's TMT fosters integration and engenders better performance (Williams and O'Reilly, 1998; Clarysse and Moray, 2004; Knockaert *et al.*, 2011). Indeed, academic members tend to replace the preexisting research team composition, preserving tacit skills and group routines (Clarysse and Moray, 2004; Knockaert *et al.*, 2011). Hence, we may assume that in a highly differentiated TMT, USOs' members perceive themselves as not sufficiently similar to implement fertile collaborative integration mechanisms spontaneously or sufficiently different to extract potential value for innovation from divergent thinking and cognitive conflicts (Kearney *et al.*, 2009; Amason and Sapienza, 1997; Nootboom *et al.*, 2007; Ensley *et al.*, 2002). Therefore, USOs showing a high degree of TMT heterogeneity cannot effectively achieve internal coordination and efficiency since, on the one hand, automatic mechanisms emerge less frequently and less rapidly than in more homogeneous ones and, on the other hand, the pressure to engage in effortful integration endeavors is lower. Our result contrasts several previous studies highlighting the importance of "surrogate entrepreneurs" in providing complementary skills to the USO's TMT (Franklin *et al.*, 2001; Wennberg *et al.*, 2011; Visintin and Pittino, 2014).

We also found support for H2, corroborating those studies highlighting that homogeneity in academics' scientific background may enhance members' cooperation (Williams and O'Reilly, 1998) with the development of shared norms (Beckman *et al.*, 2007) or "mindsets"

(Knockaert *et al.*, 2011). Accordingly, homogeneity improves internal communication among members, promotes mutual monitoring, and helps in establishing a wide range of routines. Consequently, homogeneity in academic scientific backgrounds improves interaction and communication among members (Zenger and Lawrence, 1989), promoting mutual monitoring (Grandori, 2000) and establishing a negotiated pattern of decision-making premises which, in turn, shapes organizational processes and structures. Therefore, we rejected the lines of evidence of Ensley and Hmieleski (2005) and Beckman *et al.* (2007). They revealed the importance of a more comprehensive set of scientific backgrounds and functional expertise in enhancing USOs' economic performance.

Regarding H3, i.e. the impact of interlocking directors on USOs' economic performance, we did not find any significant result in the context of academic business ventures.

Our data show that CEO duality (H4) negatively impacts on USOs' economic performance. Thus, we can support the agency theory perspective, agreeing with Pugliese and Wenstop (2007). They argued that even in small firms, the chairperson and chief executive officer should not be the same person, as such overlap may lead to an imbalance of power, thereby diminishing the USO's performance.

Concerning USOs' gender diversity, we did not find any support for H5. However, we acknowledge that a more detailed analysis is necessary, given that the low number of women observed in our sample (24) limits the reliability of our evidence.

Overall, our findings yield two main insights into the extensive literature on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Bercovitz and Feldman, 2008; Jain *et al.*, 2009). The first insight concerns the presence of academics in USOs' TMTs. Contrary to Visintin and Pittino (2014), who asserted that a well-balanced TMT in scientific and business orientation might enhance a USO's economic performance, our study shows that USOs should leverage academic competencies to grow economically (Ferretti *et al.*, 2020). On this ground, according to Wright *et al.* (2012), we recognized that academic knowledge has important implications for local economic competitiveness. USOs can be potential drivers for regional and national development, fostering economic growth (Di Gregorio and Shane, 2003), creating employment in science-based sectors (Clarysse *et al.*, 2005; O'Shea *et al.*, 2008), and bridging industry to science. Hence, our empirical findings reconcile with studies on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Jain *et al.*, 2009). First, preserving TMT homogeneity in terms of academic composition requires the empowerment of academics' knowledge, emphasizing the role of individual competencies in determining venture performance. Second, exploring USOs' micro-level functioning contributes to understanding key macro-level dynamics, such as TTO practices in supporting the development of USOs (Wright *et al.*, 2012), especially in a resource-constrained environment such as southern Italy (Algieri *et al.*, 2013).

Furthermore, even the agency perspective provides some additional insights into the field of micro-foundations. According to Parente *et al.* (2011), adopting a micro-foundational approach to analyze governance problems in USOs requires the consideration of the information asymmetry between academic and nonacademic members. Indeed, academics members intimately involved with the creation of the technology and its development have more information than their nonacademic counterparts. To overcome such problems, some mechanisms of participation of inventors and investors in the company should be found (Wright *et al.*, 2006). On this ground, CEO duality generates an imbalance of power, thus increasing the information asymmetry between the academic and nonacademic subgroups (Tang, 2017).

5. Practical implications

Our results agree with previous studies on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Jain *et al.*, 2009). Empirical findings suggest that

USOs need to leverage academic knowledge to shape their management teams due to their peculiar nature. Hence, our main contribution is that TMTs should be composed mainly of academics from the same scientific background to ensure shared norms and routines.

Following a micro-foundations approach, we assert that USOs managers should share a unique pool of specialized scientific competencies within the management team. In the absence of market knowledge and industry experience, the emergence of spontaneous, user-friendly organizational solutions enhanced by a close-knit scientific community could be particularly fruitful in USOs' TMTs, boosting the assimilation of homogeneous bodies of knowledge in product/service development and other specialized technical tasks. According to [Clarysse and Moray \(2004\)](#), we posit that the positive effects of TMTs homogeneity are more likely to be perceived when academic managers mainly market to users familiar with their knowledge domain and do not see the need to integrate complementary business knowledge ([Colombo and Piva, 2012](#); [Villani et al., 2018](#)).

Moreover, managers should avoid overlapping roles (i.e. CEO duality) as it may cause an imbalance of power, a less independent board and a lower efficiency in supervising managers' activities. This "tailored" governance model could be framed as a best practice for universities in fostering local economic development, thanks to the socio-economic externalities coming from the effective exploitation of academics' scientific knowledge. This methodology, specifically "USOs calibrated," can be helpful both for recognizing the potential of academic expertise in the early stage and measuring if the growth is going toward a sustainable and scalable path in the following steps ([Iazzolino et al., 2019](#)).

The importance of TMT composition also has relevant implications for the management and policy support of academic entrepreneurship programs. In agreement with [Pöhlmann et al. \(2020\)](#), the managers of university TTOs should assess different strategies according to USOs' peculiarities in the design and implementation of their scouting, coaching and consulting activities. They should distinguish those having a pronounced market orientation from those aimed at enlarging and deepening researchers' scientific and technological competencies ([Colombo and Piva, 2012](#)). Moreover, TTOs should provide USOs' academic members with adequate managerial skills for the practical commercialization of products and services since external nonacademic managers in TMT can cause dysfunctional conflicts between members and harmful effects on the economic performance.

It implies that TTOs should be more focused on "educating" academic managers to gain knowledge and abilities from practical backgrounds. To this end, a "T-shaped" approach to entrepreneurial education might boost the achievement of technical and complementary expertise essential for approaching problem-solving in current socio-economic scenarios ([Saviano et al., 2017](#)). This might lead to the conceptualization of T-shaped professionals, characterized by expertise in one or more scientific disciplines coupled with other scientific and practical abilities, such as managerial skills. In this way, USOs' academic members could achieve entrepreneurial self-awareness, which changes their perceptions about their capabilities and future professional life ([Fayolle and Gailly, 2008](#)). This implies an interesting practical implication, which pushes TTOs to promote closer connections between scientific disciplines and specific functional domains to prepare academic managers to challenge the complex issues USOs face.

On this ground, an essential tool for mobilizing and integrating skills could be the improvement of transversal projects between spin-offs and users, involving numerous organizational subsystems and generating temporary forms of organizations parallel to permanent ones. Indeed, the uncertainty relating to the design of scientific technologies with highly innovative content can incentivize USOs to collaborate with others operating in the same market context or managed by researchers belonging to the same network or even form user-customer involvement in the design of technologies. Therefore, cross-cutting projects might generate more integrated interorganizational forms, reduce environmental

uncertainty, and create new interdependencies between the loosely coupled subsystems of research organizations. Finally, transversal projects could boost new skills, often resulting from recombining an innovative key to those sedimented initially in the individual, organizational subsystems. We can consider transversal projects as “laboratories of interdisciplinary knowledge” (Warglien, 1995) in the strictly scientific field and regarding the knowledge and practices of research management and technology transfer processes.

A greater emphasis on the project as a USO’s fundamental element allows researchers to be anchored to their bases of specialist skills while experimenting with forms of interorganizational mobility. It is thus possible to facilitate the hybridization process of competencies distributed in scientific spin-offs, stimulate internal dissemination processes and consolidate the highest levels of organizational integration.

In conclusion, our practical implications reconcile with studies on the micro-foundations of academic entrepreneurship (Ankrah *et al.*, 2013; Jain *et al.*, 2009) for several reasons:

- (1) Preserving TMT homogeneity in terms of academic composition requires the empowerment of academics’ knowledge, emphasizing the role of individual competencies in determining venture performance.
- (2) The acquisition of managerial skills may enhance academics’ entrepreneurial awareness, attitudes and skills, allowing them to challenge the current complexity and uncertainty typical of current socio-economic scenarios.
- (3) Exploring USOs’ micro-level functioning contributes to understanding key macro-level dynamics, such as TTO practices in supporting USOs development.

6. Limitations and further research

Our study has some limitations. Above all, the participation of women in TMTs is a liability as we did not analyze women’s managerial tasks in corporate decision-making. Furthermore, the low number of women observed (24) in USOs’ TMTs limits the generalizability of our empirical results. Additionally, we evaluated the number of academics in TMTs, regardless of whether they are shareholders. This might be relevant for assessing the relationship between academic shareholding and USO strategic decisions. We are also aware of the insufficient development of conceptualization of some dimensions. For example, the measure of SBH does not consider the backgrounds of nonacademics. In addition, we did not consider whether TMT members have similar previous work experiences and/or past working experience in the same team.

Given these limitations and consistent with our empirical study, we suggest the following topics for future research: (1) analysis of the academic founders’ tendency to be shareholders and its impact on economic performance and innovation readiness; (2) exploration of how the USO research team members are hierarchically bound to academic careers or are willing to exploit their knowledge and capabilities in a business context; (3) determination of factors that undermine female involvement in a USO’s TMT and (4) clarification from a TTO perspective of whether improving academics’ managerial skills may enhance their entrepreneurial self-awareness, which is essential for problem-solving in current socio-economic scenarios such as those faced by USOs.

References

- Abramo, G., D’Angelo, C.A., Ferretti, M. and Parmentola, A. (2012), “An individual-level assessment of the relationship between spin-off activities and research performance in universities”, *R&D Management*, Vol. 42 No. 3, pp. 225-242.

- Agarwal, R. and Shah, S.K. (2014), "Knowledge sources of entrepreneurship: firm formation by academic, user and employee innovators", *Research Policy*, Vol. 43 No. 7, pp. 1109-1133.
- Ahn, J.M., Minshall, T. and Mortara, L. (2018), "How do entrepreneurial leaders promote open innovation adoption in small firms?", in Vanhaverbeke, W.F.F., Frattini, F., Roijakkers, N. and Usman, M. (Eds), *Researching Open Innovation in SMEs, Singapore*, World Scientific Publishing, pp. 137-177.
- Algieri, B., Aquino, A. and Succurro, M. (2013), "Technology transfer offices and academic spin-off creation: the case of Italy", *The Journal of Technology Transfer*, Vol. 38 No. 4, pp. 382-400.
- Amason, A.C. and Sapienza, H.J. (1997), "The effects of top management team size and interaction norms on cognitive and affective conflict", *Journal of Management*, Vol. 23 No. 4, pp. 495-516.
- Amason, A.C., Shrader, R.C. and Tompson, G.H. (2006), "Newness and novelty: relating top management team composition to new venture performance", *Journal of Business Venturing*, Vol. 21 No. 1, pp. 125-148.
- Anderson, C.A. and Anthony, R.N. (1986), *Corporate Directory*, Wiley Publication, New York.
- Ankrah, S.N., Burgess, T.F., Grimshaw, P. and Shaw, N.E. (2013), "Asking both university and industry actors about their engagement in knowledge transfer: what single-group studies of motives omit", *Technovation*, Vol. 33 Nos 2-3, pp. 50-65.
- Barney, J.B. (2001), "Resource-based theories of competitive advantage: a ten-year retrospective on the resource-based view", *Journal of Management*, Vol. 27 No. 6, pp. 643-650.
- Barney, J.A.Y. and Felin, T. (2013), "What are microfoundations?", *Academy of Management Perspectives*, Vol. 27 No. 2, pp. 138-155.
- Beckman, C.M., Burton, M.D. and O'Reilly, C. (2007), "Early teams: the impact of team demography on VC financing and going public", *Journal of Business Venturing*, Vol. 22 No. 2, pp. 147-173.
- Bell, S.T., Villado, A.J., Lukasik, M.A., Belau, L. and Briggs, A.L. (2011), "Getting specific about demographic diversity variable and team performance relationships: a meta-analysis", *Journal of Management*, Vol. 37 No. 3, pp. 709-743.
- Ben-Hafaïedh, C., Micozzi, A. and Pattitoni, P. (2018), "Academic spin-offs' entrepreneurial teams and performance: a subgroups approach", *The Journal of Technology Transfer*, Vol. 43 No. 3, pp. 714-733.
- Ben-Hafaïedh, C., Micozzi, A. and Pattitoni, P. (2022), "Incorporating non-academics in academic spin-off entrepreneurial teams: the vertical diversity that can make the difference", *R&D Management*, Vol. 52 No. 1, pp. 67-78.
- Bercovitz, J. and Feldman, M. (2008), "Academic entrepreneurs: organizational change at the individual level", *Organization Science*, Vol. 19 No. 1, pp. 69-89.
- Bigliardi, B., Galati, F. and Verbano, C. (2013), "Evaluating performance of university spin-off companies: lessons from Italy", *Journal of Technology Management and Innovation*, Vol. 8 No. 2, pp. 178-188.
- Bogers, M., Foss, N.J. and Lyngsie, J. (2018), "The 'human side' of open innovation: the role of employee diversity in firm-level openness", *Research Policy*, Vol. 47 No. 1, pp. 218-231.
- Bonardo, D., Paleari, S. and Vismara, S. (2011), "Valuing university-based firms: the effects of academic affiliation on IPO performance", *Entrepreneurship Theory and Practice*, Vol. 35 No. 4, pp. 755-776.
- Boyd, B.K. (1995), "CEO duality and firm performance: a contingency model", *Strategic Management Journal*, Vol. 16 No. 4, pp. 301-312.
- Budescu, D.V. and Budescu, M. (2012), "How to measure diversity when you must", *Psychological Methods*, Vol. 17 No. 2, pp. 215-227.
- Bunderson, J.S. and Van der Vegt, G.S. (2018), "Diversity and inequality in management teams: a review and integration of research on vertical and horizontal member difference", *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 5 No. 1, pp. 47-73.

- Carter, D.A., Simkins, B.J. and Simpson, W.G. (2003), "Corporate governance, board diversity, and firm value", *Financial Review*, Vol. 38 No. 1, pp. 33-53.
- Charness, G. and Gneezy, U. (2012), "Strong evidence for gender differences in risk taking", *Journal of Economic Behavior and Organization*, Vol. 83 No. 1, pp. 50-58.
- Chiesa, V. and Piccaluga, A. (2000), "Exploitation and diffusion of public research: the case of academic spin-off companies in Italy", *R&D Management*, Vol. 30 No. 4, pp. 329-340.
- Clarysse, B. and Moray, N. (2004), "A process study of entrepreneurial team formation: the case of a research-based spin-off", *Journal of Business Venturing*, Vol. 19 No. 1, pp. 55-79.
- Clarysse, B., Wright, M., Lockett, A., Van de Velde, E. and Vohora, A. (2005), "Spinning out new ventures: a typology of incubation strategies from European research institutions", *Journal of Business Venturing*, Vol. 20 No. 2, pp. 183-216.
- Clarysse, B., Tartari, V. and Salter, A. (2011), "The impact of entrepreneurial capacity, experience and organizational support on academic entrepreneurship", *Research Policy*, Vol. 40 No. 8, pp. 1084-1093.
- Cohen, S.K. and Munshi, N.V. (2017), "Innovation search dynamics in new domains: an exploratory study of academic founders' search for funding in the biotechnology industry", *Technological Forecasting and Social Change*, Vol. 100 No. 120, pp. 130-143.
- Cohen, J., Cohen, P., West, S.G. and Aiken, L.S. (1983), *Applied Multiple Regression. Correlation Analysis for the Behavioral Sciences*, Routledge, London.
- Cohen, L., Frazzini, A. and Malloy, C. (2008), "The small world of investing: board connections and mutual fund returns", *Journal of Political Economy*, Vol. 116 No. 5, pp. 951-979.
- Colombo, M.G. and 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*, Vol. 25 No. 6, pp. 610-626.
- Colombo, M.G. and Piva, E. (2012), "Firms' genetic characteristics and competence-enlarging strategies: a comparison between academic and non-academic high-tech start-ups", *Research Policy*, Vol. 41 No. 1, pp. 79-92.
- Colombo, M.G., D'Adda, D. and Piva, E. (2010), "The contribution of university research to the growth of academic start-ups: an empirical analysis", *The Journal of Technology Transfer*, Vol. 35 No. 1, pp. 113-140.
- Cox, T. Jr (2001), *Creating the Multicultural Organization: A Strategy for Capturing the Power of Diversity*, Jossey-Bass, San Francisco, CA.
- Criaco, G., Minola, T., Migliorini, P. and Serarols-Tarrés, C. (2014), "To have and have not": founders' human capital and university start-up survival", *The Journal of Technology Transfer*, Vol. 39 No. 4, pp. 567-593.
- Czarnitzki, D., Rammer, C. and Toole, A.A. (2014), "University spin-offs and the 'performance premium'", *Small Business Economics*, Vol. 43 No. 2, pp. 309-326.
- Dahlstrand, Å.L. and Politis, D. (2013), "Women business ventures in Swedish university incubators", *International Journal of Gender and Entrepreneurship*, Vol. 5 No. 1, pp. 78-96.
- Davis, G.F., Yoo, M. and Baker, W.E. (2003), "The small world of the American corporate elite, 1982-2001", *Strategic Organization*, Vol. 1 No. 3, pp. 301-326.
- De Nicola, M., Corsi, C. and Prencipe, A. (2019), "The emerging effect of outside directors on the financial performance of Italian University spin-offs", *International Journal of Humanities and Social Science*, Vol. 9 No. 11, pp. 27-33.
- Debackere, K. and Veugelers, R. (2005), "The role of academic technology transfer organizations in improving industry science links", *Research Policy*, Vol. 34 No. 3, pp. 321-342.
- Di Bernardino, D. (2016), "Corporate governance and firm performance in new technology ventures", *Procedia Economics and Finance*, Vol. 100 No. 39, pp. 412-421.

- Di Gregorio, D. and Shane, S. (2003), "Why do some universities generate more start-ups than others?", *Research Policy*, Vol. 32 No. 2, pp. 209-227.
- Diénez-González, J.P. and Camelo-Ordaz, C. (2016), "How management team composition affects academic spin-offs' entrepreneurial orientation: the mediating role of conflict", *The Journal of Technology Transfer*, Vol. 41 No. 3, pp. 530-557.
- Díaz-Fernández, M.C., González-Rodríguez, M.R. and Simonetti, B. (2019), "The moderating role of top management team diversity in strategic change in a multicultural context", *European Management Review*, Vol. 16 No. 4, pp. 957-973.
- Duru, A., Iyengar, R.J. and Zampelli, E.M. (2016), "The dynamic relationship between CEO duality and firm performance: the moderating role of board independence", *Journal of Business Research*, Vol. 69 No. 10, pp. 4269-4277.
- Ensley, M.D. and Hmieleski, K.M. (2005), "A comparative study of new venture top management team composition, dynamics and performance between university-based and independent start-ups", *Research Policy*, Vol. 34 No. 7, pp. 1091-1105.
- Ensley, M.D., Pearson, A.W. and Amason, A.C. (2002), "Understanding the dynamics of new venture top management teams: cohesion, conflict, and new venture performance", *Journal of Business Venturing*, Vol. 17 No. 4, pp. 365-386.
- Fayolle, A. and Gailly, B. (2008), "From craft to science: teaching models and learning processes in entrepreneurship education", *Journal of European Industrial Training*, Vol. 32 No. 7, pp. 569-593.
- Felin, T. and Foss, N.J. (2005), "Strategic organization: a field in search of micro-foundations", *Strategic Organization*, Vol. 3 No. 4, pp. 441-455.
- Felin, T., Foss, N.J., Heimeriks, K.H. and Madsen, T.L. (2012), "Microfoundations of routines and capabilities: individuals, processes, and structure", *Journal of Management Studies*, Vol. 49 No. 8, pp. 1351-1374.
- Felin, T., Foss, N.J. and Ployhart, R.E. (2015), "The microfoundations movement in strategy and organization theory", *The Academy of Management Annals*, Vol. 9 No. 1, pp. 575-632.
- Ferretti, M., Ferri, S., Fiorentino, R., Parmentola, A. and Sapio, A. (2020), "What drives the growth of academic spin-offs? Matching academics, universities, and non-research organizations", *International Entrepreneurship and Management Journal*, Vol. 16 No. 1, pp. 137-163.
- Ferri, S., Fiorentino, R., Parmentola, A. and Sapio, A. (2019), "Patenting or not? The dilemma of academic spin-off founders", *Business Process Management Journal*, Vol. 25 No. 1, pp. 84-103.
- Filatotchev, I. and Toms, S. (2003), "Corporate governance, strategy and survival in a declining industry: a study of UK cotton textile companies", *Journal of Management Studies*, Vol. 40 No. 4, pp. 895-920.
- Fini, R., Grimaldi, R., Marzocchi, G.L. and Sobrero, M. (2012), "The determinants of corporate entrepreneurial intention within small and newly established firms", *Entrepreneurship Theory and Practice*, Vol. 36 No. 2, pp. 387-414.
- Fini, R., Fu, K., Mathisen, M.T., Rasmussen, E. and Wright, M. (2017), "Institutional determinants of university spin-off quantity and quality: a longitudinal, multilevel, cross-country study", *Small Business Economics*, Vol. 48 No. 2, pp. 361-391.
- Franklin, S.J., Wright, M. and Lockett, A. (2001), "Academic and surrogate entrepreneurs in university spin-out companies", *The Journal of Technology Transfer*, Vol. 26 No. 1, pp. 127-141.
- Goethner, M., Obschonka, M., Silbereisen, R.K. and Cantner, U. (2012), "Scientists' transition to academic entrepreneurship: economic and psychological determinants", *Journal of Economic Psychology*, Vol. 33 No. 3, pp. 628-641.
- Grandori, A. (2000), *Organization and Economic Behaviour*, Routledge, London.
- Groysberg, B. and Bell, D. (2013), "Dysfunction in the boardroom", *Harvard Business Review*, Vol. 91 No. 6, pp. 89-97.

- Hambrick, D.C. and Mason, P.A. (1984), "Upper echelons: the organization as a reflection of its top managers", *Academy of Management Review*, Vol. 9 No. 2, pp. 193-206.
- Harrison, D.A. and Klein, K.J. (2007), "What's the difference? Diversity constructs as separation, variety, or disparity in organizations", *Academy of Management Review*, Vol. 32 No. 4, pp. 1199-1228.
- Heirman, A. and Clarysse, B. (2004), "How and why do research-based start-ups differ at founding? A resource-based configurational perspective", *The Journal of Technology Transfer*, Vol. 29 Nos 3-4, pp. 247-268.
- Hesse, N. and Sternberg, R. (2017), "Alternative growth patterns of university spin-offs: why so many remain small?", *International Entrepreneurship and Management Journal*, Vol. 13 No. 3, pp. 953-984.
- Hossinger, S.M., Chen, X. and Werner, A. (2020), "Drivers, barriers and success factors of academic spin-offs: a systematic literature review", *Management Review Quarterly*, Vol. 70 No. 1, pp. 97-134.
- Iacobucci, D., Iacopini, A., Micozzi, A. and Orsini, S. (2011), "Fostering entrepreneurship in academic spin-offs", *International Journal of Entrepreneurship and Small Business*, Vol. 12 No. 4, pp. 513-533.
- Iaquinto, A.L. and Fredrickson, J.W. (1997), "Top management team agreement about the strategic decision process: a test of some of its determinants and consequences", *Strategic Management Journal*, Vol. 18 No. 1, pp. 63-75.
- Iazzolino, G., Coniglio, I.M., Verteramo, S. and Giglio, C. (2019), "University students and entrepreneurship: an empirical analysis on Italian Universities", *Journal of Entrepreneurship Education*, Vol. 22 No. 5, pp. 1-16.
- Jain, S., George, G. and Maltarich, M. (2009), "Academics or entrepreneurs? Investigating role identity modification of university scientists involved in commercialization activity", *Research Policy*, Vol. 38 No. 6, pp. 922-935.
- Kearney, E., Gebert, D. and Voelpel, S.C. (2009), "When and how diversity benefits teams: the importance of team members' need for cognition", *Academy of Management Journal*, Vol. 52 No. 3, pp. 581-598.
- Keck, S.L. (1997), "Top management team structure: differential effects by environmental context", *Organization Science*, Vol. 8 No. 2, pp. 143-156.
- Klotz, A.C., Hmieleski, K.M., Bradley, B.H. and Busenitz, L.W. (2014), "New venture teams: a review of the literature and roadmap for future research", *Journal of Management*, Vol. 40 No. 1, pp. 226-255.
- Knockaert, M., Ucbasaran, D., Wright, M. and Clarysse, B. (2011), "The relationship between knowledge transfer, top management team composition, and performance: the case of science-based entrepreneurial firms", *Entrepreneurship Theory and Practice*, Vol. 35 No. 4, pp. 777-803.
- Krause, R., Semadeni, M. and Cannella, A.A. Jr (2014), "CEO duality: a review and research agenda", *Journal of Management*, Vol. 40 No. 1, pp. 256-286.
- Krishnan, H.A., Miller, A. and Judge, W.Q. (1997), "Diversification and top management team complementarity: is performance improved by merging similar or dissimilar teams?", *Strategic Management Journal*, Vol. 18 No. 5, pp. 361-374.
- Langowitz, N.S., Minniti, M. and Arenius, P. (2005), "Global entrepreneurship monitor: 2004 report on women and entrepreneurship", in Acs, Z.J., Arenius, P., Hay, M. and Minniti, M. (Eds), *Executive Report*, London.
- Li, J. and Hambrick, D.C. (2005), "Factional groups: a new vantage on demographic faultlines, conflict, and disintegration in work teams", *Academy of Management Journal*, Vol. 48 No. 5, pp. 794-813.
- Li, H. and Li, J. (2009), "Top management team conflict and entrepreneurial strategy making in China", *Asia Pacific Journal of Management*, Vol. 26 No. 2, pp. 263-283.

- Lockett, A., Siegel, D., Wright, M. and Ensley, M.D. (2005), "The creation of spin-off firms at public research institutions: managerial and policy implications", *Research Policy*, Vol. 34 No. 7, pp. 981-993.
- Lundqvist, M.A. (2014), "The importance of surrogate entrepreneurship for incubated Swedish technology ventures", *Technovation*, Vol. 34 No. 2, pp. 93-100.
- Mathisen, M.T. and Rasmussen, E. (2019), "The development, growth, and performance of university spin-offs: a critical review", *The Journal of Technology Transfer*, Vol. 44 No. 6, pp. 1891-1938.
- Migliori, S., Pittino, D., Consorti, A. and Lucianetti, L. (2019), "The relationship between entrepreneurial orientation, market orientation and performance in university spin-offs", *International Entrepreneurship and Management Journal*, Vol. 15 No. 3, pp. 793-814.
- Miranda, F.J., Chamorro-Mera, A. and Rubio, S. (2017), "Academic entrepreneurship in Spanish universities: an analysis of the determinants of entrepreneurial intention", *European Research on Management and Business Economics*, Vol. 23 No. 2, pp. 113-122.
- Mosey, S. and Wright, M. (2007), "From human capital to social capital: a longitudinal study of technology-based academic entrepreneurs", *Entrepreneurship Theory and Practice*, Vol. 31 No. 6, pp. 909-935.
- Murray, A.I. (1989), "Top management group heterogeneity and firm performance", *Strategic Management Journal*, Vol. 10, pp. 125-141.
- Mustar, P., Renault, M., Colombo, M.G., Piva, E., Fontes, M., Lockett, A., Wright, M., Clarysse, B. and Moray, N. (2006), "Conceptualising the heterogeneity of research-based spin-offs: a multi-dimensional taxonomy", *Research Policy*, Vol. 35 No. 2, pp. 289-308.
- Neter, J., Kutner, M.H., Nachtsheim, C.J. and Wasserman, W. (1996), *Applied Linear Statistical Models*, McGraw-Hill, New York.
- Newbert, S.L., Gopalakrishnan, S. and Kirchoff, B.A. (2008), "Looking beyond resources: exploring the importance of entrepreneurship to firm-level competitive advantage in technologically intensive industries", *Technovation*, Vol. 28 Nos 1-2, pp. 6-19.
- Nicolaou, N. and Birley, S. (2003), "Academic networks in a trichotomous categorisation of university spinouts", *Journal of Business Venturing*, Vol. 18 No. 3, pp. 333-359.
- Nikiforou, A., Zabara, T., Clarysse, B. and Gruber, M. (2018), "The role of teams in academic spin-offs", *Academy of Management Perspectives*, Vol. 32 No. 1, pp. 78-103.
- Nooteboom, B., Van Haverbeke, W., Duysters, G., Gilsing, V. and Van den Oord, A. (2007), "Optimal cognitive distance and absorptive capacity", *Research Policy*, Vol. 36 No. 7, pp. 1016-1034.
- Ortín-Ángel, P. and Vendrell-Herrero, F. (2014), "University spin-offs vs other NTBFs: total factor productivity differences at outset and evolution", *Technovation*, Vol. 34 No. 2, pp. 101-112.
- Owen-Smith, J. (2005), "Dockets, deals, and sagas: commensuration and the rationalization of experience in university licensing", *Social Studies of Science*, Vol. 35 No. 1, pp. 69-97.
- O'Shea, R.P., Chugh, H. and Allen, T.J. (2008), "Determinants and consequences of university spinoff activity: a conceptual framework", *The Journal of Technology Transfer*, Vol. 33 No. 6, pp. 653-666.
- Parente, R., Feola, R. and Petrone, M. (2011), "Corporate governance models as a bridge for linking academic and non-academic entrepreneurs: the case of Italian spin-offs", *Industry and Higher Education*, Vol. 25 No. 2, pp. 119-131.
- Parmentola, A. and Ferretti, M. (2018), "Stages and trigger factors in the development of academic spin-offs: an explorative study in southern Italy", *European Journal of Innovation Management*, Vol. 21 No. 3, pp. 478-500.
- Pfeffer, J. (1972), "Size and composition of corporate boards of directors: the organization and its environment", *Administrative Science Quarterly*, Vol. 17 No. 2, pp. 218-228.
- Pfeffer, J. and Salancik, G.R. (1978), *The External Control of Organizations: A Resource Dependence Perspective*, Stanford University Press, Redwood City, CA.

- Pöhlmann, K., Helm, R., Mauroner, O. and Auburger, J. (2020), "Corporate spin-offs' success factors: management lessons from a comparative empirical analysis with research-based spin-offs", *Review of Managerial Science*, Vol. 15 No. 6, pp. 1-30.
- Prencipe, A. (2016), "Board composition and innovation in university spin-offs: evidence from the Italian context", *Journal of Technology Management and Innovation*, Vol. 11 No. 3, pp. 33-39.
- Pugliese, A. and Wenstøp, P.Z. (2007), "Board members' contribution to strategic decision-making in small firms", *Journal of Management and Governance*, Vol. 11 No. 4, pp. 383-404.
- Ramaciotti, L. and Rizzo, U. (2015), "The determinants of academic spin-off creation by Italian universities", *R&D Management*, Vol. 45 No. 5, pp. 501-514.
- Rapporto Netval (2018), "La rete del trasferimento tecnologico si rafforza con la clinical innovation", Rapporto Netval, XIV, Università degli Studi di Pavia - Servizio Ricerca e Terza Missione, Pavia.
- Rashid, M.A. and Lodh, S.C. (2011), "Corporate governance and performance of small and medium sized enterprise (SME): evidence from Bangladesh", in Hoque, T. (Ed.), *5th Asian Business Research Conference: World Business Institute Australia*, Melbourne, pp. 1-44.
- Rasmussen, E. and Wright, M. (2015), "How can universities facilitate academic spin-offs? An entrepreneurial competency perspective", *The Journal of Technology Transfer*, Vol. 40 No. 5, pp. 782-799.
- Rasmussen, E., Mosey, S. and Wright, M. (2011), "The evolution of entrepreneurial competencies: a longitudinal study of university spin-off venture emergence", *Journal of Management Studies*, Vol. 48 No. 6, pp. 1314-1345.
- Rasmussen, E., Mosey, S. and Wright, M. (2015), "The transformation of network ties to develop entrepreneurial competencies for university spin-offs", *Entrepreneurship and Regional Development*, Vol. 27 Nos 7-8, pp. 430-457.
- Rosa, P. and Dawson, A. (2006), "Gender and the commercialization of university science: academic founders of spinout companies", *Entrepreneurship and Regional Development*, Vol. 18 No. 4, pp. 341-366.
- Rothaermel, F.T., Agung, S.D. and Jiang, L. (2007), "University entrepreneurship: a taxonomy of the literature", *Industrial and Corporate Change*, Vol. 16 No. 4, pp. 691-791.
- Sauermann, H. and Stephan, P. (2013), "Conflicting logics? A multidimensional view of industrial and academic science", *Organization Science*, Vol. 4 No. 3, pp. 889-909.
- Saviano, M., Polese, F., Caputo, F. and Wallezky, L. (2017), "The contribution of systems and service research to rethinking higher education programs: a T-shaped model", *Sinergie Italian Journal of Management*, Vol. 35, No. Sep-Dec, pp. 51-70.
- Scholten, V., Omta, O., Kemp, R. and Elfring, T. (2015), "Bridging ties and the role of research and start-up experience on the early growth of Dutch academic spin-offs", *Technovation*, Vol. 45, pp. 40-51.
- Sciascia, S., Mazzola, P. and Chirico, F. (2013), "Generational involvement in the top management team of family firms: exploring nonlinear effects on entrepreneurial orientation", *Entrepreneurship Theory and Practice*, Vol. 37 No. 1, pp. 69-85.
- Serrasqueiro, Z., Nunes, P.M., Leitão, J. and Armada, M. (2010), "Are there non-linearities between SME growth and its determinants? A quantile approach", *Industrial and Corporate Change*, Vol. 19 No. 4, pp. 1071-1108.
- Shefer, D. and Frenkel, A. (2005), "R&D, firm size and innovation: an empirical analysis", *Technovation*, Vol. 25 No. 1, pp. 25-32.
- Shrader, C.B., Blackburn, V.B. and Iles, P. (1997), "Women in management and firm financial performance: an exploratory study", *Journal of Managerial Issues*, Vol. 9 No. 3, pp. 355-372.
- Siegel, D.S., Veugelers, R. and Wright, M. (2007), "Technology transfer offices and commercialization of university intellectual property: performance and policy implications", *Oxford Review of Economic Policy*, Vol. 23 No. 4, pp. 640-660.

- Steffens, P., Terjesen, S. and Davidsson, P. (2012), "Birds of a feather get lost together: new venture team composition and performance", *Small Business Economics*, Vol. 39 No. 3, pp. 727-743.
- Stephan, P.E. and El-Ganainy, A. (2007), "The entrepreneurial puzzle: explaining the gender gap", *The Journal of Technology Transfer*, Vol. 32 No. 5, pp. 475-487.
- Tagliacruzchi, G., Marchi, G. and Balboni, B. (2021), "A nonlinear relationship between the team composition and performance in university spin-offs", *Technological Forecasting and Social Change*, Vol. 172, 121061.
- Taheri, M. and van Geenhuizen, M. (2016), "Teams' boundary-spanning capacity at university: performance of technology projects in commercialization", *Technological Forecasting and Social Change*, Vol. 111, pp. 31-43.
- Talke, K., Salomo, S. and Kock, A. (2011), "Top management team diversity and strategic innovation orientation: the relationship and consequences for innovativeness and performance", *Journal of Product Innovation Management*, Vol. 28 No. 6, pp. 819-832.
- Tang, J. (2017), "CEO duality and firm performance: the moderating roles of other executives and blockholding outside directors", *European Management Journal*, Vol. 35 No. 3, pp. 362-372.
- Thatcher, S.M. and Patel, P.C. (2012), "Group faultlines: a review, integration, and guide to future research", *Journal of Management*, Vol. 38 No. 4, pp. 969-1009.
- Vanaelst, I., Clarysse, B., Wright, M., Lockett, A., Moray, N. and S'Jegers, R. (2006), "Entrepreneurial team development in academic spinouts: an examination of team heterogeneity", *Entrepreneurship Theory and Practice*, Vol. 30 No. 2, pp. 249-271.
- Vesperi, W. and Gagnidze, I. (2019), "Rethinking the university system: toward the entrepreneurial university (the case of Italy)", *Kybernetes*, Vol. 50 No. 7, pp. 2021-2041.
- Villani, E., Linder, C. and Grimaldi, R. (2018), "Effectuation and causation in science-based new venture creation: a configurational approach", *Journal of Business Research*, Vol. 83, pp. 173-185.
- Visintin, F. and Pittino, D. (2010), "Successful technology transfer in uncertain contexts: the role of top management team diversity in university spin-off firms", *Atti Del XI Workshop Dei Docenti e Dei Ricercatori Di Organizzazione Aziendale*, Vol. 2, pp. 1-15.
- Visintin, F. and Pittino, D. (2014), "Founding team composition and early performance of university—based spin-off companies", *Technovation*, Vol. 34 No. 1, pp. 31-43.
- Vohora, A., Wright, M. and Lockett, A. (2004), "Critical junctures in the development of university high-tech spinout companies", *Research Policy*, Vol. 33 No. 1, pp. 147-175.
- Walter, A., Auer, M. and Ritter, T. (2006), "The impact of network capabilities and entrepreneurial orientation on university spin-off performance", *Journal of Business Venturing*, Vol. 21 No. 4, pp. 541-567.
- Warglien, M. (1995), "Hierarchical selection and organizational adaptation", *Industrial and Corporate Change*, Vol. 4 No. 1, pp. 161-186.
- Wei, L.Q. and Wu, L. (2013), "What a diverse top management team means: testing an integrated model", *Journal of Management Studies*, Vol. 50 No. 3, pp. 389-412.
- Wennberg, K., Wiklund, J. and Wright, M. (2011), "The effectiveness of university knowledge spillovers: performance differences between university spinoffs and corporate spinoffs", *Research Policy*, Vol. 40 No. 8, pp. 1128-1143.
- West, J., Salter, A., Vanhaverbeke, W. and Chesbrough, H. (2014), "Open innovation: the next decade", *Research Policy*, Vol. 43 No. 5, pp. 805-811.
- Williams, K.Y. and O'Reilly, C.A. III (1998), "Demography and diversity in organizations: a review of 40 years of research", *Research in Organizational Behavior*, Vol. 20, pp. 77-140.
- Wilson, F., Kickul, J. and Marlino, D. (2007), "Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: implications for entrepreneurship education", *Entrepreneurship Theory and Practice*, Vol. 31 No. 3, pp. 387-406.

Wright, M., Lockett, A., Clarysse, B. and Binks, M. (2006), "University spin-out companies and venture capital", *Research Policy*, Vol. 35 No. 4, pp. 481-501.

Wright, M., Mosey, S. and Noke, H. (2012), "Academic entrepreneurship and economic competitiveness: rethinking the role of the entrepreneur", *Economics of Innovation and New Technology*, Vol. 21 Nos 5-6, pp. 429-444.

Wuyts, S., Colombo, M.G., Dutta, S. and Nooteboom, B. (2005), "Empirical tests of optimal cognitive distance", *Journal of Economic Behavior and Organization*, Vol. 58 No. 2, pp. 277-302.

Zenger, T.R. and Lawrence, B.S. (1989), "Organizational demography: the differential effects of age and tenure distributions on technical communication", *Academy of Management Journal*, Vol. 32 No. 2, pp. 353-376.

Corresponding author

Lorenzo Turriziani can be contacted at: lorenzo.turriziani@unina.it