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**Organizing at the Top of the Hierarchy:  
An Inquiry into Delegation of Decisions**

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*A Papà e Mamma,  
Per il loro amore e sostegno infiniti e incondizionati,  
e senza i quali nessuno dei miei successi sarebbe possibile.*

*To those who walked with me on this journey,  
And made it extraordinary.*

*To Myself,  
Because this is not the end,  
But the starting point.*



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## 1. INTRODUCTION

Over the last 10 years, there has been a resurgence of interest around the study of firms' organizational design<sup>1</sup>. Starting from the theory of upper echelons and the idea that organizations are a reflection of their top managers (D. Hambrick & Mason, 1984), scholars have devoted a large effort to study Top Management Teams (TMTs). Indeed, TMTs are a fundamental part of firms as they are formed by those managers (including the Chief Executive Officer, CEO) typically involved in deciding the large and strategic issues facing the firm, thus involved in the strategic decision-making (Amason, 1996; Collins & Clark, 2003). Being responsible of firm's strategy, coordination activities, and allocation of resources (Guadalupe, Li, & Wulf, 2014), TMT members, and their characteristics, influence strategic and organizational outcomes (Hambrick, 2007). In fact, their characteristics affect how they interpret the situations they face and the decisions they make (Hambrick, 2007), thus having an impact on performance (e.g., Carpenter & Fredrickson, 2001; Eisenhardt & Bourgeois, 1988; Hambrick, 2007). Besides an initial focus on the demographic characteristics of TMT members (e.g., age, nationality, language, education), which are important to derive explanations for strategic and performance outcomes (e.g., Bantel & Jackson, 1989; Boeker, 1997; Carpenter & Fredrickson, 2001; Eisenhardt & Bourgeois, 1988; Hambrick, 2007), scholars have noted that also TMT's structure and process dimensions are relevant (Carpenter, Geletkanycz, & Sanders, 2004). However, limited attention has been given to the analysis of TMTs' structure and internal organization (i.e., TMT's organizational design). Therefore, more research is needed to understand what are its antecedents and the implications for firms' performance and strategies. In this thesis, I contribute to this stream of research, studying first the antecedents and then the consequences of TMT's organizational design.

For what concern the antecedents, I specifically focus on the study of delegation or the allocation of decision authority, i.e. whether decision authority is centralized or delegated downward the organizational hierarchy (Aghion & Tirole, 1997; Hempel, Zhang, & Han, 2012; Lin & Germain, 2003. See Colombo & Delmastro, 2008, Chapter 4, for a review), which is one of the key dimensions of organizational design (Aghion & Tirole, 1997; Hayek, 1945; March & Simon, 1958)<sup>2</sup>. Among the others, delegation helps to make the best use of the knowledge and

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<sup>1</sup> This phenomenon is witnessed by the increasing number of papers published in academic journals and containing the term organizational design in their titles or abstracts.

<sup>2</sup> The other elements are: organizational form, hierarchy, coordination mechanisms and division of labor (Burton et al., 2006; Child, 1972; Daft, 2010; Jones, 2010; Mintzberg, 1993).

information distributed within the firm (Acemoglu, Aghion, Lalarge, Van Reenen, & Zilibotti, 2007; Hayek, 1945; Jensen & Meckling, 1992), improves the motivation, creativity, initiative and effort of those employees to whom the decision authority is delegated (Benabou & Tirole, 2003; Gagné & Deci, 2005), and protects the time of senior managers from information overload (Garicano & Rossi-Hansberg, 2006; Harris & Raviv, 2005). As a consequence, delegation ultimately has a positive effect on firm's efficiency (Harris & Raviv, 2005) and performance (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Lin & Germain, 2003). Despite the several contributions that highlighted the positive effects of delegation and, thus, its relevance, the literature still suffers from some limitations. First, it rarely addressed the top of the hierarchy, thus disregarding the delegation of strategic decisions at this level and mainly focusing on the general firm level or plant level of analysis (e.g., Acemoglu et al., 2007; Aghion, Bloom, & Van Reenen, 2014; Bloom, Sadun, & Van Reenen, 2009; Bloom et al., 2010; Bloom & Sadun, 2012; Colombo & Delmastro, 2008). However, results obtained at these lower levels not necessarily can be generalized at the TMT one. Referring to the definition of decision systems by Keidel (1995), several factors may cause this non-generalizability. A first factor might be the different types of decisions taken at the two levels. In particular, TMT level decisions are the most relevant in a firm as they deal with firm's strategic direction and they are strictly related to performance (Dess & Davis, 1984; Snow & Hambrick, 1980; Zahra, 1996); conversely, decisions at the plant level are less strategic and more operative. The non-generalizability might also depend on the people and roles involved. Compared to their principals, plant managers might possess more specialized knowledge, in relation to the decisions they have to make, while this might not necessarily be the case for TMT managers (i.e., they might possess the same knowledge of the CEO). Moreover, time constraints might be different: it is reasonable to expect that TMT managers are more time constrained than plant managers. Finally, there might be differences in the way decisions are made, in particular in term of decision speed and comprehensiveness. At the TMT level, due to the strategic nature of decisions, both the dimensions are very important and a trade-off exists between comprehensiveness and speed. Meanwhile, the operative decisions at the plant level can be made more quickly by the plant manager and the trade-off between decision speed and comprehensives is weaker. A second important limit of the delegation literature resides in the study of its determinants. Scholars devoted great effort in studying the motivations behind the choice between delegation and centralization. At the same time, academic research witnessed a general trend on the importance of individual characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013; Felin, Foss, Heimeriks, & Madsen, 2012). Individual characteristics may shape organizational design



(Hambrick, 2007), and thus delegation, ultimately affecting performance (e.g., Carpenter & Fredrickson, 2001; Eisenhardt & Bourgeois, 1988; Hambrick, 2007). However, their influence to the study of the allocation of decision authority is still limited. Finally, considering instead the consequences of TMT's organizational design, the variety of studies on this aspect typically considered the different elements that compose it at the general firm level and separately (e.g., Foss, Laursen, & Pedersen, 2011; Jansen, van den Bosch, & Volberda, 2005), without taking into account the complementarities that exist among them (Ennen & Richter, 2010). Therefore, it emerges also the need to study the effect of organizational design's elements as a combination of variables (Foss, Lyngsie, & Zahra, 2013).

The present thesis intends to fill the aforementioned gaps providing empirical contributions to the study of the antecedents and consequences of organizational design at the TMT level. More specifically, the thesis aims to answer to the following overarching research questions: *(ii) How do individual characteristics shape delegation at the TMT level? Specifically, how do they influence the delegation of a strategic decision from the Board of Directors to the CEO and, afterwards, from the CEO to the TMT managers? (i) In line with the complementarities existing between them, how are organizational design elements combined at the TMT level and what are the consequences of the resulting TMT organizational configurations?*

Answering to the first question, I go further in the literature on the allocation of decision authority, which typically disregarded this level of analysis and the delegation of strategic decisions. I thus bridge research on the TMT with the studies on delegation, an attempt rarely made in the literature (see Harris and Raviv, 2005, Ling, Simsek, Lubatkin and Veiga, 2008, Oehmichen, Schult and Wolff, 2015, Wong, Ormiston and Tetlock, 2011, for exceptions). In addition, as it will be clear reading the following of the thesis, I focus on two specific individual characteristics that allegedly influence delegation from the Board of Directors (board) to the CEO and from the CEO to the TMT managers: gender and decision-specific knowledge. Thus, I also contribute to the gender literature and, marginally, to the debate on boards. By answering the second question, instead, I contribute to the organizational design literature, taking into account the complementarities that exist among organizational design elements (Ennen & Richter, 2010) and studying them at the level of the TMT. Moreover, as explained in the following of the thesis, I also advance the literature on opportunity exploitation, which is the specific consequence I consider.

The thesis is organized as follows. First (Section 2), I introduce the research questions that the research project intends to answer. Second (Section 3), I briefly describe the specific data collection that allowed me to address these research questions. In so doing, particular relevance is given to the survey data collection I did and thus to the paper *zero* of the research project, which describes its methodology. Third (Section 4), I summarize the findings of the three main empirical papers that compose the thesis. Then (Section 5), I highlight the original contributions of the thesis from both an academic and a practitioner viewpoint. Lastly (Section 6), I conclude providing some possible future research directions on the topic addressed in the research project. Annexes present the final manuscript of the papers.

## 2. RESEARCH QUESTIONS

As aforementioned, the first aim of this research project is to go deeper in the study of the antecedents of delegation (or allocation of decision authority). In so doing, I focus on the top of the hierarchy and, thus, on the TMT, due to its key role in making strategic decisions (Amason, 1996; Collins & Clark, 2003), which is facilitated by a good allocation of decision authority.

Allocation of decision authority is one of the most important organizational design elements (Aghion & Tirole, 1997; Hayek, 1945; March & Simon, 1958). Accordingly, scholars have devoted considerable attention to understand what determines the allocation of decision authority within firms (Colombo & Delmastro, 2008; Jensen & Meckling, 1992). As already mentioned and deeply explained in the previous section, the relevance of delegation is in its ability to ultimately positively influence firms' efficiency (Harris & Raviv, 2005) and performance (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Lin & Germain, 2003). However, there is still a lack of research on how decision authority is allocated at the top of the firm, thus disregarding the delegation of strategic decisions. Indeed, the majority of the contributions on delegation took into account the general firm level or the plant level (e.g., Acemoglu et al., 2007; Aghion et al., 2014; Bloom et al., 2009, 2010; Bloom & Sadun, 2012; Colombo & Delmastro, 2008), the delegation of specific decisions or within particular functional areas of the firm (e.g., IT decisions, Brown and Magill (1998), or financial ones, Graham, Harvey, and Puri (2015), the R&D function, Arora, Belenson, and Rios (2014)), or the relation between headquarters and subsidiaries (Sengul & Gimeno, 2013). Contrarily, few scholars addressed delegation at the TMT level (e.g., Harris & Raviv, 2005; Ling, Simsek, Lubatkin, & Veiga, 2008; Oehmichen, Schult, & Wolff, 2015; Wong, Ormiston, & Tetlock, 2011). Due to the scarce

knowledge in this realm, I contribute bringing the study of delegation at this level of analysis. Moreover, I adopt a decision-level unit of analysis as the characteristics of the specific strategic decision taken into consideration and other decision-level factors may influence the allocation of decision authority. In so doing, in the first part of this research project I study the antecedents of delegation, specifically analyzing the role of individual characteristics.

First, I focus on the allocation of responsibility over strategic decisions from the board to the CEO (Useem & Zelleke, 2006; Van Den Berghe & Baelden, 2005). Indeed, as the board represents the ownership of the firm (Fama & Jensen, 1983), it has to ensure that management's decisions are in the best interest of firm's shareholders (Boyd, 1994). Consequently, the board monitors firm's top management and advises it in its decision-making activity (Bianco, Ciavarella, & Signoretti, 2015). From this perspective, a fundamental task of the board consists in determining the level of decision autonomy to be granted to the CEO in the different domains of activity (i.e., the allocation of decision authority over different strategic decisions). Apart from the interest in the role of knowledge, the delegation literature has failed to give adequate attention to the characteristics of individuals despite the increased importance of these characteristics in organizations witnessed in the literature (e.g., Barney & Felin, 2013; Devinney, 2013; Felin, Foss, Heimeriks, & Madsen, 2012). For this reason, in the first essay of the thesis I focus on a relevant individual characteristic, which is the *gender* of the CEO.

Organizations are not insensible to gender (e.g., Dezso & Ross, 2012; Dezso, Ross, & Uribe, 2016), which has proven to be relevant in many aspects of firms' organizational design (Baron, Hannan, & Burton, 1999; Kanter, 1997; Mukhtar, 2002), while, to date, it has gone under-remarked in studies on the allocation of decision authority. Generally, a principal delegates decision authority to an individual if he believes she is competent (Hayek, 1945) and trustworthy (Jensen & Meckling, 1976). However, if the principal does not have reliable information on the ability of the agent to properly make a specific decision, then the allocation of decision authority may be driven by stereotypes, which indeed help deciding using a limited set of information (Renwick & Tosi, 1978; Tosi & Einbender, 1985). It does follow the importance of gender, which is one of the typical sources of stereotypes. To provide some examples, there is a general conviction that women are less competent and knowledgeable than men (De Pater, Van Vianen, & Bechtoldt, 2010; Northouse, 2003; Oakley, 2000; Yang & Aldrich, 2014), they tend to make decisions without consulting other managers (Mukhtar, 2002), they pursue objectives different than profit (Daymont & Andrisani, 1984), are unpredictable (Brescoll, 2016; Still, 1994),

and encounter difficulties in enforcing their orders, due, for instance, to their linguistic style (Oakley, 2000; Tannen, 1994a, 1994b). Therefore, with the following research questions, I try to disentangle whether the gender of individuals influence the extent to which they are entitled with decision authority. More precisely, I argue that the probability that the board delegates authority over a strategic decision to the CEO decreases if the CEO is a woman, unless the female CEO proves to the board her competences and trustworthiness. Accordingly, I expect that CEO's generic managerial knowledge, represented by the possession of an MBA, and decision-specific knowledge, as reflected by the work experience in the functional area corresponding to the specific strategic decision taken into account, alleviate the negative effect of the gender stereotypes. Coherently, I address the following research questions.

**RQ1A.** *Does the gender of the CEO influence the probability that the board delegates a strategic decision to her/him? Specifically, is this probability lower in case of a female CEO?*

**RQ1B.** *Does CEO's knowledge influence this relation by reducing the negative effect of gender stereotypes?*

Once established whether and how CEO's individual characteristics (i.e., gender and knowledge) determine the allocation of decision authority from the board to the CEO, the second essay of this research project moves its attention towards the delegation of strategic decisions from the CEO to the TMT managers. Also in this case, the focus is on the delegation of the single strategic decisions made within the firm, and thus on the dyadic relation between the CEO and the TMT manager who is responsible of the domain of the specific strategic decision taken into consideration. As in the previous research questions, I address individual characteristics, but considering those of both the CEO and the manager. Specifically, I focus on the decision-specific knowledge possessed by the two parties of the dyadic relation. Indeed, the importance of knowledge in the allocation of decision authority has been theoretically stated by previous research (e.g., Harris & Raviv, 2005; Hayek, 1945), but empirical research on this topic appears to be scarce and, to date, it has only dealt with that possessed by the decision authority holder (i.e., the individual who may or may not delegate decision authority).

Specifically, Dobrajska et al. (2015) found that possessing decision-specific knowledge (i.e., knowledge in line with the decision that has to be made) influences delegation, but they analyzed only the decision authority holder (DAH). Despite this, it is reasonable to think that also the knowledge and capabilities of the decision authority recipient (DAR) matter and that decision

authority should be delegated in case he has an informational advantage over the DAH (Harris & Raviv, 2005), thus co-locating authority and knowledge (Hayek, 1945; Jensen & Meckling, 1992) and improving the quality of the decision. Accordingly, in the second essay of the thesis I advance the work of Dobrajska et al. (2015), first partially replicating it at a higher level of the hierarchy (i.e., the CEO-TMT level), and then addressing also the knowledge possessed by the DAR (i.e., the TMT manager in my case). Apart from knowledge, another finding of Dobrajska et al. (2015) that I replicate in the essay concerns the decision-workload of the DAH (i.e., the number of strategic decisions she is responsible for), which is found to positively influence delegation. Indeed, in studying delegation from the CEO to the TMT manager it is worth taking into account also this element because CEOs usually have limited management time as they are time constrained over the number of strategic decisions that have to be made to run the company (Chandler, 1962; Penrose, 1959). The increase in CEO's decision-workload may result in excessive information processing compared to her cognitive capacity (March & Simon, 1958; Rivkin & Siggelkow, 2003), which, in turn, leads to information overload and lower decision-making effectiveness (Gavetti, Levinthal, & Ocasio, 2007; Mendelson, 2000; Ocasio, 1997, 2011; Simon, 1982). I thus investigate whether the negative effect of the DAH's decision-specific knowledge and the positive one of her decision-workload found by Dobrajska et al. (2015) still hold at this level of analysis. Then, I add DAR's knowledge, investigating its direct relation with delegation and studying whether the effect of CEO's and TMT manager's decision-specific knowledge varies depending on how many strategic decisions the CEO has to deal with. Along with this reasoning, in the second essay I answer to the following research questions.

**RQ2A.** *Taken a strategic decision and the TMT manager responsible of its domain, do CEO's decision-workload and CEO's and TMT manager's decision-specific knowledge influence the probability that the CEO delegates that strategic decision to the TMT manager?*

**RQ2B.** *Does the effect of decision-specific knowledge change with the increase in the level of CEO's decision-workload?*

Once studied the antecedents of delegation, I then address the consequences of TMT's organizational design. In so doing, I do not only focus on delegation, but on the main organizational design elements that together contribute in defining TMT's organizational design. Then, I study its relation with opportunity exploitation, which consists in "the deployment of resources, actions, and investments to realize recognized opportunities" (Foss et al., 2013, p. 1453) and plays an important role determining firm's performance (Foss et al., 2013; Rauch, Wiklund, Lumpkin, &

Frese, 2009). To date, the organizational antecedents of opportunity exploitation have gone rather under-remarked, but it would be reasonable to expect that TMT's organization matters. Indeed, exploiting opportunities likely requires strategic decision-making by the TMT in defining which opportunities to pursue, what resources to mobilize, what actions to implement, and the amount of investments needed.

Opportunity exploitation received scarce attention in the organizational literature and, to the best of my knowledge, the only exceptions are the works of Foss and colleagues (2013, 2015), which found a positive relation between the amount of opportunities exploited and the level of delegation, formalization, and use of coordination mechanisms within the firm. Nevertheless, these studies, as the others on opportunity exploitation, analyzed the firm in general, without considering the key role of the TMT. In addition, this literature did not consider that firms may face diverse kinds of opportunities, whose exploitation likely requires diverse organizational arrangements. Therefore, the third and last essay of the research project addresses this gap, trying to understand whether TMT's organization influences firm's opportunity exploitation. In so doing, it is worth mentioning that I look at the organization of the TMT as whole, focusing on its organizational configurations and further advancing TMT and organizational design literature. Indeed, as mentioned before, prior contributions have typically investigated organizational design elements separately (e.g., Foss et al., 2011; Jansen et al., 2005), but authors suggested the need to study these elements as a combination of variables (Foss et al., 2013), in line with the complementarities that exist among them (Ennen & Richter, 2010). Following, I study organizational elements simultaneously, adopting a configurational approach (e.g., Gruber, Heinemann, Brettel, & Hungeling, 2012; Mendelson, 2000). Along this line of reasoning, I combine the main TMT's organizational elements (i.e., delegation, incentives, coordination, communication, size, and formalization) to understand whether different TMT configurations exist. Finally, once established the presence of different ways in which TMTs can be organized, I make an effort in understanding their implications for firm's opportunity exploitation. Therefore, I answer the following research questions.

**RQ3A.** *Do different TMT organizational configurations exist resulting from the combination of the main organizational design elements at the TMT level?*

**RQ3B.** *If they exist, how do TMT organizational configurations influence firm's opportunity exploitation?*

The following Figure 1 provides a scheme of the research project and the research questions addressed.

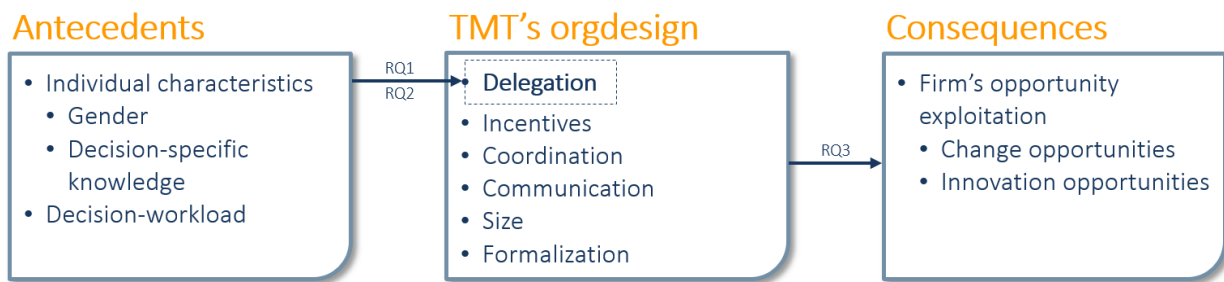


Figure 1. Scheme of the thesis

### 3. METHODOLOGY

One of the main difficulties in studying the organizational design of TMTs resides in the availability of useful data. Indeed, data on TMTs' organizational design are rarely available from secondary sources like commercial databases or balance sheets. For this reason, I first had to conduct a survey data collection to gather data directly from CEOs, then complemented with data from secondary sources. Therefore, I introduce here the paper *zero* of the thesis, which describes the methodology I adopted to collect data and to check their reliability.

#### PAPER 0. Collecting Data on TMTs' Organizational Design: Good Practices from the StiMa Project

The paper zero gives start to the research project presented in this thesis. It specifically describes the methodology I adopted to collect organizational design data directly from the CEOs of Italian firms. Indeed, it is difficult to find data on TMT's organizational design from secondary source, as commercial databases (e.g., CorpTech<sup>3</sup>, Compustat<sup>4</sup>, S&P Capital IQ<sup>5</sup>, and Execucomp<sup>6</sup>) provide information mainly on top executives' demographic characteristics and primarily covering large firms located in the US. Conversely, these sources rarely report information on how TMTs organize, thus the only viable way to obtain these data consists in asking them to CEOs and TMT members (Cycyota & Harrison, 2006; Norburn & Birley, 1988). In fact, since the seminal contributions of the ASTON Group (e.g., Pugh, Hickson, & Hinings, 1969; Pugh, Hickson, Hinings, & Turner, 1968), directly gathering data from employees and managers has become the gold

<sup>3</sup> [www.corptech.com](http://www.corptech.com)

<sup>4</sup> [www.compustat.com](http://www.compustat.com)

<sup>5</sup> [www.capitaliq.com](http://www.capitaliq.com)

<sup>6</sup> <http://www.spcapitaliq.com/our-capabilities/our-capabilities.html?product=compustat-execucomp>

standard in the field of organizational design, regardless of the organizational aspects that researchers intend to investigate (Y. Baruch & Holtom, 2008; Colombo & Delmastro, 2008; Kraut, 1996; Norburn & Birley, 1988).

Therefore, my main data collection consists in a survey, which is a common methodology for researchers in the organization field (Y. Baruch & Holtom, 2008; Kraut, 1996). Specifically, I addressed a structured questionnaire directly to the CEOs of a sample of Italian firms (*StiMa project*). The questions asked to CEOs concern all the most important organizational design elements, which in this case are investigated at the TMT level. These include (e.g., Burton, Obel, & DeSanctis, 2006; Child, 1972; Daft, 2010; Jones, 2010; Mintzberg, 1993): i) formal and informal coordination and communication mechanisms among top executives; ii) allocation of authority over strategic decisions to the CEO, from the CEO to TMT members, and from these latter to managers at a lower level of the corporate hierarchy; iii) division and specialization of managerial labor; iv) organization of the decision making process; and v) time management by the CEO. In addition, I collected information on behavioral aspects such as leadership, trust, or behavioral integration. With the research group of the *StiMa project*, I created the questionnaire basing on constructs and questions already validated in the literature and then I pilot tested and pretested it. Afterwards, I retrieved the population of Italian firms (50,341) with at least 20 employees and operating in the manufacturing and services industries from the *Research Department of the Milan Chamber of Commerce* and I randomly extracted a sample of 6,108 firms, stratifying it on the number of employees, the industry, and the geographical location (North, Center, and South of Italy). Because finding the direct contact information of the CEOs of these firms was difficult, I succeeded in addressing the questionnaire to a reduced sample of 3,899 CEOs (and firms). Once the survey concluded, the usable sample counted 241 firms, corresponding to a response rate of 6.18%. Despite this response rate may appear low, it is in line with those of similar studies on CEOs (e.g., Poterba and Summers (1995) obtained a 4% response rate on their survey addressed to German CEOs) and, more generally, no rules exist in the literature on the acceptable response rate (Dennis, 2003).

At the end of the survey, I performed a series of checks, deeply described in the paper (see Annex 0), to control for (i) the representativeness of the sample, which is considered by scholars more important than the response rate (C. Cook, Heath, & Thompson, 2000); (ii) the possible presence of non-response biases, to provide further support to the *StiMa project's* response rate and to prevent obtaining biased estimates in future works (Armstrong & Overton, 1977); (iii) the



reliability of CEOs' answers, comparing them to those collected addressing a second questionnaire to their Chief Human Resources Officers. Neither of these aspects appeared to be a concern. Then, I retrieved additional data from other sources. Secondary sources I used are firm's balance sheets and CEOs' and TMT managers' biographies. The former served to collect data about firms' performance and boards' composition. The latter were coded to systematize information on CEOs' and TMT managers' educational background, work experience, and, thus, decision-specific knowledge. Adding to this, I administered to the CEOs who participated in the *StiMa project* the Narcissistic Personality Inventory (NPI, Raskin and Terry (1988)), which is the commonly used instrument to measure narcissistic traits (Andreassen, Ursin, Eriksen, & Pallesen, 2012a; Bianchi, 2014; O'Reilly, Doerr, Caldwell, & Chatman, 2014; Petrenko, Aime, Ridge, & Hill, 2015). Finally, in the next months, I will collect additional data on CEOs' and TMT managers' physical appearance and attractiveness. The following Figure 2 synthetizes the structure and the data included in the database I created.

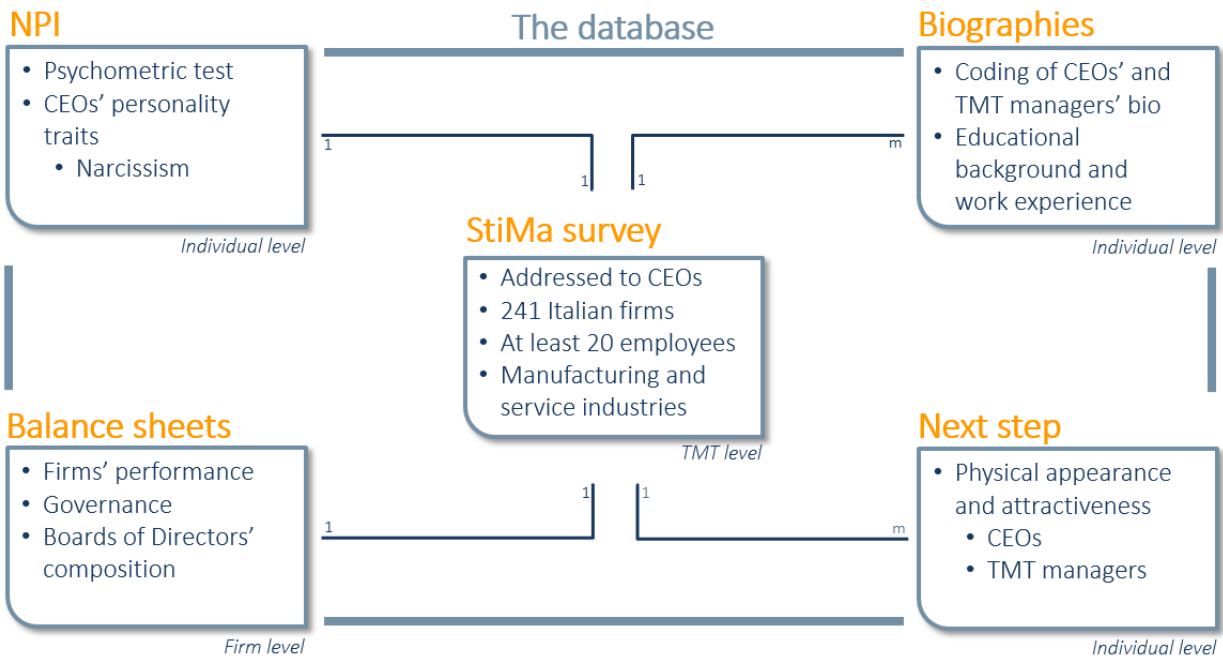


Figure 2. Structure of the database

Relying on the successful case of the *StiMa project*, aside from describing in very detail all the methodology, the paper *zero* aims to offer scholars good practices for improving the research design of their surveys intended to collect data on TMTs' organizational design. Indeed, collecting data from individuals at the top of hierarchies poses specific challenges depending on the peculiarities of this population. For instance, retrieving contact information (e.g., email addresses) to invite CEOs and other TMT members to participate in surveys is far from simple, especially in the case of unlisted firms, or it is difficult to convince them to spend time to participate in the

survey (Y. Baruch, 1999), due to the severe time constraints that individuals at the top of the corporate hierarchy usually face (Y. Baruch, 1999; Y. Baruch & Holtom, 2008; Cooper & Payne, 1988; Falconer & Hodgett, 1999) and to their reluctance to disclose what they perceive to be sensitive information. Moreover, setting up a questionnaire that is effective in collecting organizational design data is a challenging task. Therefore, the paper provides a set of *good practices* to advise researchers in this realm.

#### 4. PAPERS

In order to answer to the aforementioned research questions, I developed three papers, which base on the data collection described in the previous Sections 3. Table 1 lists the papers, indicating co-authors, research questions to which they answer, and their status. In the following, the findings of these three main papers are presented, while their final version is reported in Annexes. As the papers target different journals, their layouts are not homogenous.

**Table 1.** List of the papers composing the research project

Paper	Reference	Research question	Status
0	Rovelli, P., & Rossi-Lamastra, C. <i>Collecting Data on TMTs' Organizational Design: Good Practices from the StiMa Project</i>	-	Forthcoming <i>Journal of Industrial and Business Economics</i>
1	Colombo, M. G., Rossi-Lamastra, C., & Rovelli, P.* <i>Women at the Top: The Effect of CEO's Gender on the Allocation of Decision Authority by the Board of Directors</i>	RQ1A RQ2B	Working paper
2	Colombo, M. G., Rossi-Lamastra, C., & Rovelli, P.* <i>Delegation from the CEO to Top Executives: The Role of Decision-Workload and Decision-Specific Knowledge</i>	RQ2A RQ2A	Working paper
3	Spina, G., Rovelli, P., Colombo, M. G., Bartezzaghi, E., Cagliano, R., Longoni, A., Rossi-Lamastra, C. <i>Opportunity Exploitation and TMT Organizational Configurations</i>	RQ3A RQ3B	Working paper

## PAPER 1. Women at the Top: The Effect of CEO's Gender on the Allocation of Decision Authority by the Board of Directors

The first essay of the research project (see Annex 1) investigates the antecedents of delegation (or allocation of decision authority) at the very top of the hierarchy. Indeed, adopting a decision-level unit of analysis, it addresses the delegation of strategic decisions by the board to the CEO. In so doing, two individual characteristics are taken into consideration: the gender of the CEO, which consists in the main focus of the work, and the knowledge she possesses.

Confirming the main hypotheses of the paper, the empirical analysis on a sample of decision-level observations demonstrates that the gender of the CEO does influence the delegation policy of the board. Indeed, female CEOs are less likely to receive decision authority over a strategic decision compared to male CEOs. Therefore, a gender disparity exists in allocating decision authority at this level of analysis. This finding supports the idea explained in the paper that when the board does not have reliable information on the ability of the CEO to make proper strategic decisions, gender stereotypes affect the board's perception of the loss of information and the loss of control problems that may arise when dealing with the allocation of decision authority. Indeed, gender stereotypes allow to judge and make decisions in presence of a limited set of information (Renwick & Tosi, 1978) and negatively influence the perception of boards (and TMTs), which are typically male dominated entities (Deszo et al., 2016; Deszo & Ross, 2012; Singh et al., 2001; Singh & Vinnicombe, 2004), towards female CEOs. Specifically, there is a general conviction that women (and thus female CEOs) are less competent and knowledgeable than men (De Pater et al., 2010; Northouse, 2003; Yang & Aldrich, 2014), tend to make decisions without consulting other managers (Mukhtar, 2002), pursue other objectives than maximizing shareholders' value (Daymont & Andrisani, 1984), are more unpredictable (Brescoll, 2016; Still, 1994) and encounter difficulties in enforcing their orders, for instance due to the linguistic style that they usually adopt (Oakley, 2000; Tannen, 1994a, 1994b). As a consequence, if the CEO is a woman, gender stereotypes lead the board to perceive the loss of information as less severe (in case of centralization) and the loss of control as more severe (in case of delegation), thus reducing the probability of delegating a strategic decision to the female CEO.

Despite the negative influence of gender stereotypes on the probability of board's delegation that leads female CEOs to receive less decision authority, our paper demonstrates that the knowledge she possesses helps her in overcoming this situation. Indeed, the more the board

becomes aware of the CEO's ability to make "good" decisions<sup>7</sup>, the less it relies less on gender stereotypes when deciding on the allocation of decision authority, thus reducing their negative influence. In this sense, CEO's generic managerial and decision-specific knowledge are crucial. Holding an MBA (i.e., CEO's generic managerial knowledge) and having at least two years of work experience in the functional areas associated with the strategic decision taken into account (i.e., CEO's decision-specific knowledge) offset the gender disparity in the decision authority received by the board. In fact, when considering CEOs with an MBA or CEOs with more than 2 years of work experience in the decision domain, the difference between female and male CEOs in the probability that the board delegates a strategic decision in that domain disappears (while there is still a statistically significant difference when considering CEOs without generic managerial knowledge or CEOs with lower decision-specific knowledge). The reason behind this result is that possessing these two kinds of knowledge and making the board aware of this increase the board's consciousness on the ability of the CEO to make "good" decisions in the domain taken into consideration. The board thus relies on these information on CEO's knowledge and the negative effect of gender stereotypes on the loss of information and loss of control problems decreases, as holding an MBA certifies that the CEO has greater strategic decision making (Lewis, Walls, & Dowell, 2014) and communication skills, while possessing CEO's decision-specific knowledge indicates to the board that the CEO accumulated knowledge specific in the decision she has to make in case of delegation and learned by similar decision she made in the past (Fredrickson, 1985; Tesluk & Jacobs, 1998).

Finally, an ancillary results of the paper, allowed by the decision-level unit of analysis, shows that different strategic decisions are delegated differently from the board to the CEO. Boards tend to retain authority over decisions about entry or exit from markets and/or product lines, significant changes in the organizational structure, strategic alliances/partnership, major business investments and financing decisions, expansion of production capability, equipment, and plants, and significant investments in ICT. Contrarily, decision authority is typically delegated to the CEO when dealing with the introduction of significant changes in products and services and in marketing activities (including major price decisions), firm's human resources (e.g., hiring, firing, promotions, salaries and incentives for middle managers, and labor disputes with unions), and the strategic purchasing.

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<sup>7</sup> In case of delegation, the CEO is perceived to be likely to make a "good" decision when the loss of control is limited and the loss of information would be large in case of centralization.

## PAPER 2. Delegation from the CEO to Top Executives: The Role of Decision-Workload and Decision-Specific Knowledge

The second paper of the thesis studies delegation of strategic decisions at a lower, but still high, level of the hierarchy. Specifically, this essay focuses on the set of strategic decisions on which the CEO has authority and studies the allocation of this authority from the CEO to the TMT manager responsible of the domain of the specific decision taken into account. Indeed, as the previous one, also this work bases on a decision-level unit of analysis. First, the essay partially replicates the study of Dobrajska et al. (2015) at a higher level of the hierarchy, studying the influential role of CEO's decision-workload (i.e., the total number of strategic decisions the CEO is responsible for) and decision-specific knowledge. Then, it advances this paper and the delegation literature considering the role of the knowledge possessed by the TMT manager.

Results confirm the findings of Dobrajska et al. (2015). This means that, also at the TMT level, CEO's decision-workload positively influences delegation, while CEO's decision-specific knowledge has a negative effect. CEOs are usually time constrained (Chandler, 1962; Penrose, 1959) and, to avoid an excessive information processing compared to their cognitive capacity (March & Simon, 1958; Rivkin & Siggelkow, 2003), which may lead to lower decision-making effectiveness (Gavetti et al., 2007; Mendelson, 2000; Ocasio, 2011; Simon, 1982), they resort to delegation. Contrarily, when they possess knowledge specific of the strategic decision they tend to centralize decision authority (Philippe Aghion & Tirole, 1997) in order to co-locate it with knowledge (Hayek, 1945; Jensen & Meckling, 1992) and thus improve the quality of the decision using the available knowledge optimally (Hayek, 1945). This negative effect increases with the increase in the amount of strategic decisions under her responsibility but it is statistically significant only when the decision-workload is limited. When the decision-workload is too high, the CEO is forced to delegate decision authority and she exploits the knowledge she possesses to delegate to the proper TMT manager and to monitor his behavior and decision making, thus also reducing the possible problem of loss of control (Hayek, 1945; Jensen & Meckling, 1976).

Considering instead the decision-specific knowledge of the TMT manager, analyses show that it is not related to CEO's delegation. A possible explanation is that, to be nominated as members of the TMT, managers need to possess great knowledge on the decision domain for which they are responsible, as the internal promotion or the hiring reasonably base on knowledge and competences. Thus, the knowledge does not make difference in the following allocation of decision authority from the CEO as she is likely to know that managers are knowledgeable. What

makes the difference is the decision-specific knowledge of the CEO as she is the person that receives decision authority from the board and has to decide how to manage it. However, data reveal that TMT manager's decision-specific knowledge matters when the CEO's decision-workload is at its maximum. In this situation, as aforementioned, the CEO is forced to delegate decision authority and, in choosing what strategic decision to delegate, she will probably start from those whose manager is more knowledgeable (compared to the managers responsible of the other decision domains). This allows to avoid communications that might suffer from loss of information (Dessein, 2002).

Lastly, the decision-level analysis shows that some strategic decisions are typically centralized by the CEO. These decisions concern the entry or exit from markets/product lines; radical changes in organizational processes and organizational procedures and in the organizational structure; strategic alliances/partnership with other firms or organizations and major business investments; hiring, firing, promotions, salaries and incentives for middle management; expansion of production capability and expansion and modernization of production equipment and plants; significant investments in information and communication technology; and the definition of the sustainability strategy for the civil society development.

### PAPER 3. Opportunity Exploitation and TMT Organizational Configurations

The third and last output of the research project investigates the consequences of TMT's organizational design. In particular, it aims at identifying the configurations emerging at the TMT level from the interaction between a set of organizational design elements (among which there is delegation) and studying how these configurations affect firm's opportunity exploitation (also considering different types of opportunities).

To pursue these aims, I first applied a configurational approach to six organizational design elements at the TMT level: *TMT delegation*, *TMT incentives*, *TMT coordination*, *TMT communication*, *TMT size*, and *TMT formalization*. Therefore, the paper makes a step forward from the traditional organizational literature that analyzed organizational design elements mainly separately and at the general firm level (e.g., Foss et al., 2011; Jansen et al., 2005). Taking advantage of a two-step cluster analysis, three well characterized clusters, and TMT organizational configurations, emerged. The first organizational configuration, called *CEO centric TMT*, sees TMTs characterized by the lowest level of delegation and the chosen name means that decisions are

made mainly by the CEO and are not delegated downward the hierarchy. Together with this delegation level, this configuration presents a low level of TMT coordination, both formal and informal, and TMT communication, probably because, due to scarce delegation, TMT members do not need to coordinate and communicate each other to exchange information and make decisions. Moreover, *CEO centric TMTs* are the smallest (5 executives on average) and lowest formalized. Lastly, considering the three clusters, the variable compensation settles at an intermediate level for the CEO and at the lowest level for the TMT on average, meaning that incentives are not used to align TMT members' objectives. Differently, considering the second configuration (*integrated TMT*), TMTs are characterized by a high level of delegation. However, incentives are not used to align the objectives of the members, as testified by the lowest level of variable compensation (considering both the CEO and the TMT on average), but delegation pairs with the highest use of coordination and communication mechanisms, testifying an effort in developing an *integrated TMT*. In addition, also the use of formalization is high, while the size of the TMT is intermediate between the other two clusters (7 managers on average). Finally, contrary to the *CEO centric TMT*, the third cluster (*incentive based TMT*), as the previous one, shows a high level of delegation and use of formal coordination mechanisms. In other words, compared to integrated ones, these TMTs have the same level of delegation, but they differ in the instruments used to control the TMT. Specifically, the use of informal coordination mechanisms and ongoing communication is lower, while incentives result as the main instrument used to align TMT members' objectives and facilitate the decision-making process. Indeed, CEO's and TMT's variable compensation is higher than in the other two clusters. Moreover, these TMTs are the biggest (8 members on average) and, because the high use of incentives distinguishes them from the other two clusters, this configuration was called *incentive based TMT*.

These three TMT organizational configurations (*CEO centric TMT*, *integrated TMT*, and *incentive based TMT*) appear to be significantly related to firm's opportunity exploitation. Specifically, when the TMT is organized basing on an *integrated TMT* or an *incentive based TMT* configuration, firms exploit a higher number of opportunities. In addition, to further advance the literature on opportunity exploitation, I also considered two different types of opportunities. The first one are *innovation opportunities* and include the followings: (i) new products and services; (ii) new production technologies; (iii) entry into new markets; and (iv) new ways to manage R&D. The second category, which are *change opportunities*, refers to the exploitation of opportunities associated with the organization of the firm: (i) changes in the organization (structure and work),

(ii) new ways to manage HR, and (iii) new ways to manage accounting and finance. The exploitation of both innovation opportunities and change opportunities is positively related to the *integrated TMT* and the *incentive TMT* configurations. Differently, only the *integrated TMT* is associated with change opportunities.

## 5. CONTRIBUTION AND IMPACT

The main aim of this research project was to understand the antecedents and consequences of TMT's organizational design. In so doing, I first collected data useful for this purpose through a survey addressed directly to Italian CEOs (i.e., the *StiMa project*) and gathering additional data using secondary sources and the NPI psychometric test. This data collection allowed me to create a very unique database that I then used to answer to the aforementioned research questions and to develop future studies in the field. Specifically, in the first and second paper of the research project I used these data to investigate one of the main organizational design element and study whether and how individual characteristics affect the allocation of authority over strategic decisions. In detail, the first of the two studies delegation from the board to the CEO and the role of the gender of the latter; in addition, the moderating role of CEO's knowledge is taken into account. The second paper, instead, investigates delegation from the CEO to the TMT manager who is in charge of the decision domain considered and analyses the role of the CEO's decision-workload and of the decision-specific knowledge of the CEO and the TMT manager. Finally, the third essay moves the attention to the consequences of TMT's organization and specifically investigates the configurations arising from organizational design elements' complementarities and how these TMT configurations influence the firm's exploitation of opportunities.

As aforementioned, the first two essays of the research project focus on the allocation of decision authority at the top of the hierarchy. In so doing, I address the delegation of strategic decisions, adopting a decision-level unit of analysis. Therefore, I depart from those typically used in this literature, focusing on the crucial relations between the board and the CEO and between the CEO and the TMT managers. Delegation literature has indeed analyzed the allocation of decision authority at the firm level or the plant level (e.g., Acemoglu et al., 2007; Phillippe Aghion, Bloom, & Van Reenen, 2014; Bloom et al., 2009, 2010; Bloom & Sadun, 2012; Colombo & Delmastro, 2008), considering specific types of decisions and functional areas within the firm (e.g., Brown & Magill, 1998; Graham et al., 2015; Arora et al., 2014) or the relation between



headquarter and subsidiaries (Sengul & Gimeno, 2013). Moreover, the decision-level unit of analysis I adopted allows to take into account the fact that the allocation of decision authority may vary depending on the type of strategic decision considered and on decision-level factors (e.g., decision-specific knowledge).

Another common characteristic shared by these two papers is that they advance delegation literature following the growing debate on the importance of individual characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013; Felin et al., 2012). The first one looking mainly at gender, the second one at individual (decision-specific) knowledge. More in detail, the first paper of the thesis demonstrates how female CEOs are penalized by gender stereotypes when the board has to decide on the delegation of strategic decisions. Indeed, it emerges that female CEOs are less likely to receive decision authority compared to their male colleagues. Nevertheless, the generic managerial and decision-specific knowledge possessed by female CEOs help them in overcoming this situation. These results contribute to different streams of literature. First, I advance the delegation literature in several directions. In fact, adding to the one mentioned above, I go deeper in the study of the effects of individual characteristics, focusing on the specific aspect of gender and gender stereotypes. Second, I contribute to the gender literature, introducing the study of delegation in relation to gender. Indeed, this literature disregarded this prominent aspect focusing on how female representation in management affects firm's performance (e.g., Dezsó & Ross, 2012; Dwyer, Richard, & Chadwick, 2003; Krishnan & Park, 2005; Perryman, Fernando, & Tripathy, 2016), M&A's (e.g., Parola, Ellis, & Golden, 2015) and IPOs' performance (Quintana-García & Benavides-Velasco, 2016), firm's risk taking (e.g., Baixauli-Soler, Belda-Ruiz, & Sanchez-Marin, 2015; Bao, Fainshmidt, Nair, & Vracheva, 2014; Perryman et al., 2016), and executives' compensation (Perryman et al., 2016). Third, I add to the wide debate on the Board of Directors. In the last years, scholar have devoted an intense research effort in the study of the board and its characteristics, but delegation had only a marginal role. Board's literature spans from the determinants and consequences of board's composition and structure (e.g., Baldenius, Melumad, & Meng, 2014; Bettinelli, 2011) to board's processes and interactions (e.g., Forbes & Milliken, 1999; Wan & Ong, 2005); for instance, they studied the effect of having outside (e.g., Bettinelli, 2011) or female directors (e.g., Bianco, Ciavarella, & Signoretti, 2015) in the board. In so doing, this literature stream has also disentangled the implications on firms of the board's composition and functioning (e.g., Bettinelli, 2011; Dalton & Kesner, 2014). In particular, some scholars have focused their attention on the board-CEO relation addressing the direct effect

of CEO's power (e.g., Baldenius, Melumad, & Meng, 2014), meaning the influence and bargaining power that the CEO has towards the board (Baldenius et al., 2014), and its moderating effect in the relation between board's composition and firm performance (Combs, Ketchen, Perryman, & Donahue, 2007). Quite similarly, another research stream has addressed the consequences of CEO's duality, namely the fact that the CEO is also the chairman of the board (e.g., Baldenius et al., 2014; Combs et al., 2007), and its relation with board's characteristics (e.g., Dalton & Kesner, 2014; Horner, 2010). Lastly, other researchers studied the appointment of a new CEO (e.g., Zajac & Westphal, 1996) and, more frequently, CEO's compensation (Boyd, 1994; Chhaochharia & Grinstein, 2009; Inderst & Mueller, 2005; Laux & Laux, 2009; Mangel & Singh, 1993; Westphal & Zajac, 1995). However, despite the variety of literature on the board-CEO relation, as far as I know, only two contributions analyzed the delegation of decision authority from the board to the CEO. The first one found that boards more focused on the monitoring than on the advisory role tend to delegate more (Baldenius et al., 2014). In a similar vein, the second study highlighted that higher delegation leads to stronger board's monitoring (Van Den Berghe & Baelden, 2005). Nevertheless, both these papers analyzed how the characteristics of the board affect delegation without taking into account the role of CEO's characteristics. Consequently, the first essay of the thesis contributes to this literature, also heeding the call of Van Den Berghe and Baelden (2005) for more work on how the characteristics of the firm's management influence board's delegation policy.

Apart from academic contribution, the first essay also has interesting practical implications. As a start, the paper emphasizes the difficulties that women face once reached the top of the hierarchy. Indeed, this work highlights that differences between female and male CEOs still exist. Despite the number of female CEOs increased over the last years, on average they are still in a limited number and possess less decision authority compared to male CEOs. However, our paper provides some indications on how it is possible to get rid of this situation and help female CEOs to play their role at full. In this sense, female CEOs have to develop generic managerial and decision-specific knowledge, thus working on their education and work experience, and make the board conscious of this knowledge. In so doing, the board will be more aware of the ability of the CEO to make "good" decisions and will not rely on gender stereotypes in deciding on the allocation of authority over strategic decisions. Specifically, investing in an MBA (i.e., generic managerial knowledge) is fruitful and helps female CEOs to be treated as their male counterparts. The same happens with decision-specific knowledge and female CEOs should try to diversify their work experience and highlight it in the eyes of the board's directors. In fact, when deciding whether to

delegate a specific strategic decision or not, our data show that possessing these two kinds of knowledge allows female CEOs to be treated by the board in the same way of male counterparts. At the same time, not only female CEOs have to invest in developing their knowledge, but also boards' directors have to be aware on how gender stereotypes may frame their judgment and decisions. Specifically, boards' directors have to keep in mind that when relating with a female CEO, conscious and/or unconscious biases depending on gender stereotypes may prevail, influencing their perceptions and driving their choice to delegate strategic decision authority to the CEO. To avoid this situation (and possible drawbacks depending on a non-optimal allocation of decision authority), board's directors have to remind to pay more attention to the knowledge possessed by the CEO and less to her/his gender.

Afterwards, the second paper of the thesis goes deeper in the role of knowledge in delegation. Studying the delegation of strategic decision at the TMT level (i.e., from the CEO to the TMT manager), this essay first confirms the findings of Dobrajska et al. (2015) on the positive effect of the CEO's decision-workload and the negative one of the CEO's decision-specific knowledge. Adding to these, it emerges that the decision-specific knowledge of the TMT manager responsible of the decision domain taken into account does not influence CEO's delegation. However, this knowledge comes into play when the decision-workload of the CEO is at its maximum. Contrarily, CEO's decision-specific knowledge plays a significant role only when her decision-workload is low. When the decision-workload increases, the CEO is forced to delegate, she starts to delegate the decision for which the TMT manager is knowledgeable, and she uses her own decision-specific knowledge to monitor TMT managers. Apart from those highlighted above, the main contribution of this paper resides in the empirically analysis of the knowledge of the decision authority recipient (i.e., the TMT manager). Indeed, to date delegation literature empirically tested only the effect of the decision authority holder's knowledge (e.g., Dobrajska et al., 2015), disregarding that of the recipient. Moreover, the paper may also have contributions for top managers. Indeed, it suggests that the decision-workload of the CEO plays a fundamental role in affecting her delegation policy, as the increase in the decision-workload leads her to delegate more. At the same time, the more the CEO has decision-specific knowledge, the more she is able to make decision by herself, without giving responsibilities to the managers in the TMT. However, when the CEO is too busy, TMT managers have to be ready to take responsibility over strategic decisions, as it is likely that the CEO delegates decision authority to them, despite the knowledge she possesses. In so doing, priority is given to managers more knowledgeable, i.e., those that possess greater decision-

specific knowledge compared to the managers responsible of the other decision domains. CEOs have to remind that investing in their knowledge and diversifying their work experiences (as to be knowledgeable in a greater number of strategic decisions) is fundamental. Indeed, this kind of knowledge on one hand allows them to make good quality decisions when their decision-workload is limited, on the other hand it allows to manage decision authority over a strategic decision when the decision-workload is high, understanding to whom to delegate it and being able to monitor the decision-making of the recipient.

Finally, the last essay of the research project studies the whole organization of the TMT and its implications on firm's opportunity exploitation. Empirical analyses first demonstrate that organizational design elements cluster in TMT organizational configurations: *CEO centric TMT*, *integrated TMT*, and *incentive based TMT*. A positive relation emerges between *integrated TMTs* and *incentive based TMTs* and opportunity exploitation in general. Specifically, both *integrated TMTs* and *incentive based TMTs* perform better in exploiting innovation opportunities (i.e., related to changes in processes, products and markets), while change opportunities (i.e., associated with changes in the organization) are favored only by *integrated TMTs*. These findings fill the existing gap in the opportunity exploitation literature, which has disregarded the role of organizational design elements. The only exceptions are the works of Foss et al. (2013, 2015). Moreover, organizational design elements have been typically studied in isolation and at the general firm level, without taking into account the key role of the TMT. In so doing, I contribute also to the debate on TMTs and to the literature on organizational configurations, highlighting that organizational design elements cluster in configurations at the TMT level. Moreover, the first paper may also be of relevance for practitioners. In fact, it advises CEOs on how they should organize their TMT in order to exploit opportunities. This is quite achievable for CEOs as TMT's organization is easier to change compared to firm's overall organization and it is directly manageable by the CEO. In re-organizing the TMT, CEOs have first to consider the existing interplay among the main TMT's organizational design elements (delegation, incentives, coordination, communication, size, and formalization). Second, being *integrated TMT* and *incentive based TMT* equi-final suggests that there are different ways of organizing the TMT that allow to achieve the same result in terms of opportunity exploitation. This, in turn, makes it easier for CEOs to align their TMT, allowing them to minimize the changes to implement (i.e., basing on the actual characteristics of the TMT, the CEO can choose to change its organization towards the closest configuration).

## 6. FUTURE RESEARCH DEVELOPMENTS

This research project was a first attempt to go deeper in the study of the antecedents and consequences of TMT's organizational design. Specifically, this thesis demonstrates that delegation of strategic decisions at the top of the hierarchy depends on the characteristics (i.e., gender and knowledge) of the individuals involved and that organizational configurations exist at the TMT level, which in turn influence firm's opportunity exploitation. However, this research project is not intended to end here, but I will further develop it, trying to solve the limitation of my ongoing study, answering to new relevant issues emerged in this journey, and exploiting the value of the unique data I possess.

Despite the significant and interesting results, I am aware that my work is not immune to limitations. First, it focuses on a sample of only Italian firms. Therefore, there might be problems of generalizability of results, which may not apply to different countries and cultures. A replication of the study in diverse contexts is thus suggested.

Furthermore, a main drawback of the first two essays resides in the specific individual characteristics under investigation. Other characteristics apart from gender and knowledge may be relevant in affecting the allocation of decision authority, both in the board-CEO relation and in the CEO-TMT manager one. A deeper study of the determinants of delegation would allow to understand whether decision authority over strategic decisions is allocated following rational principles. Otherwise, allocation is likely to be suboptimal, leading to detrimental decisions. For instance, delegation may be driven by personality traits, the common ground shared by the two involved parties, cultural aspects depending on where they were born and have grown up, personal experiences, etc.

Specifically focusing on the first paper, in analyzing how it is possible to overcome the negative effect of gender stereotypes on the probability of delegation by the board, only the individual characteristics of the CEO were considered. Nevertheless, also those of board's directors may matter, influencing how they perceive gender stereotypes or the CEO in general, regardless of her gender. For instance, gender stereotypes may be overcome thanks to the cultural environment in which board's directors have grown up or their level of education as, generally, highly educated individuals usually express fewer stereotypes and prejudice (Sidanius, Sinclair, & Pratto, 2006). Consequently, it would be interesting to take into account the educational background of the directors in the board and study whether a higher level of education influences the negative

relation between female CEOs and the decision authority they grant to her. In addition, this relation may be also influenced by the existing similarities among board's directors and the CEO, with the idea that the higher the similarity the lower is the perception of gender stereotypes and their influence on the allocation of decision authority. Moreover, it may be relevant to understand how much this relation between gender and delegation is generalizable, not only to other countries, but also at a different level of analysis. For instance, it would be useful to test whether the same finding holds true analyzing the relation between the CEO and her/his TMT members. Adding to this, analyzing the TMT it would be intriguing to study whether, once obtained decision authority by the board, the gender of the CEO influences also her/his disposition to delegate that decision authority to the managers belonging to it.

Going to the second paper, some characteristics of the TMT in which the manager operates may be relevant, as to make a strategic decision the manager may need to communicate with the other managers, thus influencing him in making coordinated and globally optimal decisions. Trust, formal and informal coordination, and communication may influence the decision-making of the manager, and thus the likelihood of the CEO to delegate a strategic decision. Moreover, I will try to understand whether the effect of the decision-specific knowledge possessed by the CEO depends on that of the TMT manager, and vice versa, thus testing for the presence of a moderating effect between the two.

Lastly, regarding the third essay on TMT organizational configurations, despite I deeply motivated them in the paper, I focus on some specific organizational elements. It might be that other factors matter in exploiting opportunities (e.g., behavioral elements). Moreover, it would be interesting to study whether this relation depends on CEO's individual traits and to understand what are the boundary conditions for this relation, searching for some moderating factors (e.g., the level of trust within the TMT). At the same time, it would be interesting to study how TMT configurations ultimately affect performance.

These limitations have to be taken into consideration when interpreting the results of the research project presented in this thesis. However, I am confident that they do not affect their relevance and that these limitations may instead give rise to further researches. Moreover, I hope that this work will be of inspiration for researchers to go deeper in the study of TMT's organizational design and delegation. For sure, working on this project I was personally inspired to continue doing research in this field. First, I am interested in integrating the existing database with data on CEO's and TMT manager's physical appearance and considering this as an alternative

explanation for CEO's delegation of decision authority to TMT managers, as my study demonstrated that the decision-specific knowledge of the latter does not matter. In so doing, together with their physical appearance, I will also consider CEO's narcissistic personality trait and the common ground existing between the CEO and the TMT manager, which depends on their similarities. Then, I am intrigued in understanding whether and how the adoption of TMT organizational configurations depends on the type of firm (e.g., geographical location, industry, governance) and in studying how TMT's organizational design changes depending on the type of ownership of the firm, especially referring to non-family versus family firms, which characterize the Italian context.

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ANNEX 0

# Collecting Data on TMTs' Organizational Design: Good Practices from the StiMa Project

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## ABSTRACT

Studying how Top Management Teams (TMTs) organize their managerial labor and decision-making processes is a relevant research avenue in light of the prominence of TMTs within modern firms. However, data on TMTs' organizational design are usually not available from secondary sources and must instead be collected through surveys given to top executives. To help researchers in this difficult endeavor, the present paper offers a set of good practices for designing and implementing surveys on TMTs' organizational design. To this end, we use as a basis the first-hand experience that we gained by working on the StiMa project, a large-scale data collection effort concerning the TMTs of a representative sample of Italian firms. We describe in detail all of the steps that we followed in preparing and administering the survey and in setting up and executing the additional data collection from secondary sources, which integrates survey data. We are confident that the lessons we learned from the StiMa project will help scholars in gathering better data on TMTs' organizational design, thus advancing academics' and practitioners' conversations on the topic.



## INTRODUCTION

In recent decades, scholarly interest in firms' *Top Management Team* (TMT) - the team formed by the Chief Executive Officer (CEO) and the managers who report directly to her/him (TMT members) that is responsible for the strategic decision-making (Amason 1996; Collins and Clark 2003) - has grown steadily. Many contributions in this field have related the demographic characteristics of TMT members (e.g., age, nationality, and education) to firms' strategies and performance (e.g., Bantel and Jackson 1989; Boeker 1997; Carpenter and Friedrickson 2001; Eisenhardt and Bourgeois 1988; Hambrick 2007). Other works have investigated behavioral aspects, such as CEOs' leadership styles or integration among TMT members (e.g., Battilana et al. 2010; Carmeli and Schaubroeck 2006; Carmeli et al. 2011; Hambrick 1994, 1997; Simsek et al. 2005). On the contrary, we know comparatively less on *TMTs' organizational design*, namely the ways in which the CEO and other TMT members organize their managerial work at the top of the corporate hierarchy (see Guadalupe et al. 2013, Souitaris and Maestro 2010, Wong et al. 2011 for some notable exceptions). This is a relevant gap. Indeed, to efficiently run their firms and, thus, ultimately achieve superior performance, TMTs in general and CEOs in particular must set up both formal and informal coordination and communication mechanisms, agree upon the division of their managerial labor, choose the level of specialization within the TMT, define the formalization of decision-making processes, and so on. Moreover, CEOs, who receive authority over strategic decisions by the Board of Directors, must choose whether to delegate this decision authority to other TMT members, depending, for instance, on their decision-specific knowledge and managerial experience (Colombo et al. 2016).

In light of the importance of the topic, we think that one reason behind the limited research on TMTs' organizational design resides in the difficulties accessing and collecting data in this realm. Indeed, scholars can easily retrieve demographic data on top executives from secondary sources. Commercial databases (e.g., CorpTech<sup>1</sup>, Compustat<sup>2</sup>, S&P Capital IQ<sup>3</sup>, and Execucomp<sup>4</sup>) provide detailed information on top executives, including their names, biographies, and compensation, although these databases have good coverage primarily for large firms located in the US. Currently, researchers can retrieve CEOs' and managers' biographies also on LinkedIn. Conversely, these sources rarely report information on how TMTs organize, thus the only viable way to obtain

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<sup>1</sup> [www.corptech.com](http://www.corptech.com)

<sup>2</sup> [www.compustat.com](http://www.compustat.com)

<sup>3</sup> [www.capitaliq.com](http://www.capitaliq.com)

<sup>4</sup> <http://www.spcapitaliq.com/our-capabilities/our-capabilities.html?product=compustat-execucomp>

these data consists in asking them to CEOs and TMT members (Cycyota and Harrison 2006; Norburn and Birley 1988). In fact, since the seminal contribution of the ASTON Group (e.g., Pugh et al. 1968, 1969), directly gathering data from employees and managers has become the gold standard in the field of organizational design, regardless of the organizational aspects that researchers intend to investigate (Baruch and Holton 2008; Colombo and Delmastro 2008; Kraut 1996; Norburn and Birley 1988). Such a method poses specific challenges that are even more severe when one seeks to collect survey data on TMTs' organizational design.

First, retrieving contact information (e.g., email addresses) to invite CEOs and other TMT members to participate in surveys is far from simple, especially in the case of unlisted firms. The latter neither have to disclose information on their top executives by law nor use to report this information on their websites (most of the smallest firms do not even have a website). This lack of information is made more worrisome by the fact that in many countries, including Italy, unlisted firms account for a large part of the productive system. Compared with listed firms, unlisted ones are usually smaller, suffer from resource constraints (Mahéroul 2000), and do not have to comply with regulatory norms (Buzby 1975). Therefore, they tend to have small and poorly specialized TMTs and a simple organizational structure. Given these specific characteristics, research on the organizational design of unlisted firms' TMTs can hardly benefit from the generalization of results obtained on listed firms. Second, once a researcher has managed to establish contact with CEOs and TMT members, s/he must convince them to devote time to participate in the survey (Baruch 1999). This usually requires considerable effort due to the severe time constraints that individuals at the top of the corporate hierarchy usually face (Baruch 1999; Baruch and Holtom 2008; Cooper and Payne 1988; Falconer and Hodgett 1999) and to their reluctance to disclose what they perceive to be sensitive information. Third, setting up a questionnaire that is effective in collecting organizational design data is a challenging task. As we illustrate in the following section, in the literature, there are tested scales and questions, which researchers have developed and used to collect these types of data. However, these scales and questions need to be adapted to the specific context of the research (for instance, by translating them into the language of the country where the research is conducted) and, more generally, made understandable by the top executives who are going to complete the survey. Indeed, key informants usually require considerable specialized knowledge to correctly approach organizational design concepts and constructs.

From the discussion above, it comes as no surprise that empirical studies on TMTs' organizational design based on surveys continue to lag behind. Few notable exceptions exist (e.g.,



Bandiera et al. 2008, 2011, 2013; Carpentred and Friedrichson 2001; Wiersema and Bird 1993). However, these studies have mainly targeted large firms and have analyzed organizational design elements such as hiring and firing practices, top executives' incentives and payment schemes, time management by CEOs (Bandiera et al. 2008), TMT's functional heterogeneity (Carpented and Friedrichson 2001), or turnover (Wiersema and Bird 1993). In so doing, they have disregarded other important elements, such as the allocation of decision authority within the TMT or the coordination mechanisms that TMT members put in place. Moreover, extant contributions have typically analyzed organizational design elements separately, whereas assessing these elements in conjunction would allow a deeper understanding of *complementarities* (Ennen and Richter 2010) at work in the TMT's organization. Finally, some of the surveys used by scholars to study TMTs' organizational design show unresolved biases depending, for instance, on the use of convenient samples. The SPEC project of the organizational design of the TMT of high-tech entrepreneurial ventures in Silicon Valley is a case in point (Beckman and Burton 2008; Burton and Beckman 2007).

Moving from these premises, this paper aims to offer scholars good practices for improving the research design of their surveys intended to collect data on TMTs' organizational design. In so doing, we hope to increase the availability of reliable data on this topic, thus paving the way for solid empirical research that can advance academic knowledge and inform practitioners' conversations. To this end, we are grounded on the experience that we gained by working on the *StiMa project*, which, from 2013 to 2016, collected data on TMTs' organizational design through a large-scale survey sent to CEOs of a representative sample of Italian firms with 20 or more employees. Specifically, the StiMa project gathered comprehensive data on delegation of decision authority, coordination and communication mechanisms, functional specialization of TMT members, formalization and functioning of the decision-making processes, including decision speed and comprehensiveness (see Appendices A and B for a detailed description of the constructs/concepts we gathered and of their underlining dimensions). Then, this primary data collection was integrated with the data gathered from secondary sources related to firms' performance and the individual characteristics of CEOs and TMT members (e.g., educational background, work experience, and personality traits).

The paper describes the steps that StiMa researchers followed in data collection with the aim of proposing a step-by-step procedure that other researchers can replicate. In so doing, it also highlights the main challenges that StiMa researchers faced in conducting the survey and in

collecting additional data from secondary sources. We describe how these problems were solved, thus identifying a set of *good practices* that can orient actions in this area of research. We hope that our work paves the way for further data collection efforts, which can overcome the scarcity of information and empirical studies on TMTs' organizational design, especially outside the US (Hambrick 2007) and on unlisted firms.

The remainder of the paper is structured as follows. In the next section, we briefly illustrate the overarching aim of the StiMa project and the design of the *StiMa questionnaire*. We then describe the steps we followed to develop and administer the survey and to create the complete database. Specifically, we first explain how we selected the *target population*, extracted the *sample frame* and created the *contacted sample*. Then, we report on the administration of the survey. Following that, we describe in detail the database construction, the data cleaning procedure, and the checks that we made to minimize biases and ensure data reliability. We also report how we collected additional data from secondary sources. We conclude by summarizing the main lessons that we learned from our experience within the StiMa project and that we intend to transfer to other researchers as good practices.

## THE STIMA PROJECT: A COMPREHENSIVE DATA COLLECTION ON TMTS' ORGANIZATIONAL DESIGN

### The StiMa project: an overview

Following the call of Hambrick (2007) for more research on the organization of TMTs, in 2013, a research group of the *Politecnico di Milano School of Management*<sup>5</sup> initiated the *StiMa Project*<sup>6</sup>. The project aims to study the antecedents and the performance consequences of the TMTs' organizational design and to explore their boundary conditions. To this end, it collected comprehensive data on the TMTs of Italian firms. More specifically, StiMa researchers collected data on the relevant *organizational concepts/constructs* of the TMTs' organizational design (see the following section for a detailed description).

The main instrument for data collection was a questionnaire (i.e., the *StiMa questionnaire*) administered to a sample of Italian CEOs (*see infra*). Moreover, in line with the call for the micro-foundations of organization processes (e.g., Barney and Felin 2013; Devinney 2013; Felin et al. 2012), the authors integrated survey data with additional information on the individual

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<sup>5</sup> The research group is formed by Emilio Bartezzaghi, Raffaella Cagliano, Massimo G. Colombo, Annachiara Longoni, Cristina Rossi-Lamastra, and Paola Rovelli. The group also included Gianluca Spina, deceased in February 2015.

<sup>6</sup> *StiMa* is the acronym for "Stili Manageriali", i.e. "management styles" in Italian.

characteristics and personality traits of CEOs and other TMT members. To this end, we coded their biographies (retrieved mainly from LinkedIn) and administered the Narcissistic Personality Inventory (NPI, Raskin and Terry 1988) to CEOs. Finally, researchers recorded data on firms' performance and governance from balance sheets, which are publicly available in Italy (see the *additional data collection* section for more details).

### The design of the StiMa questionnaire

As a first step of the StiMa project, in 2013, the StiMa research group developed a questionnaire to be administered to Italian CEOs. The StiMa questionnaire mainly contains questions and constructs that have already been validated in the literature and are measured on nominal scales, interval scales (i.e., Likert-like scales) and ratio scales. In using these questions and constructs in the Italian context, the researchers faced two main challenges. First, they had to translate questions into Italian. In line with established survey practices (Dillman 2000; Kriauciunas et al. 2011), they solved this problem by first translating English questions into Italian and then back-translating them into English. Then, they compared the original and the new version of the English questions to ensure that the original meaning was preserved. Second, researchers had to (slightly) modify these questions and constructs to render them fully understandable to Italian respondents.

Because we intended to gain a comprehensive understanding of TMTs' organization, we designed the questionnaire to gather data on all the most important organizational design elements. These include (e.g., Burton et al. 2006; Child 1972; Daft 2010; Jones 2010; Mintzberg 1993): i) formal and informal coordination and communication mechanisms among top executives; ii) allocation of authority over strategic decisions to the CEO, from the CEO to TMT members, and from these latter to managers at a lower level of the corporate hierarchy; iii) division and specialization of managerial labor; iv) organization of the decision making process; and v) time management by the CEO. In addition, we collected information on behavioral aspects such as leadership, trust, or behavioral integration. In total, the StiMa questionnaire includes 35 questions, 18 of which are perceptive questions (Likert-like scales). Of the latter, 13 questions (54 items in total) refer to the following 13 constructs: *investments in formal coordination mechanisms, tacit coordination mechanisms and ongoing communication among TMT members; information exchange within the TMT; strategic decision speed and comprehensiveness; procedural and process rationality; joint decision making within the TMT; political behavior; CEO leadership; trust and collaborative behavior*. See Appendix A for a detailed description of each

construct and their Cronbach's alpha. Note that all the constructs apart from formal coordination, strategic decision speed, process rationality, and political behavior have a Cronbach's alpha equal to or greater than the .70 threshold, thus corroborating their internal consistency (Nunnally 1978). The remaining five perceptive questions refer to the level of delegation, CEO's meetings with external people, the firm's sources of information, the exploitation of opportunities and the characteristics of the market; they total 46 items. See Appendix B for the structure of the StiMa questionnaire and the main questions on TMT's organizational design included in it.

The development of the questionnaire went through several steps. First, the research group drafted a first version and asked CEOs from six firms to comment on it (*pilot test*, Adrews et al. 2003; Collins 2003). The pilot test aimed to verify whether the CEOs (i) could understand the questionnaire; (ii) considered the issues included in it relevant; and (iii) thought that we had missed some important issues. The six firms were selected according to the principle of *maximum variation* (Patton 2005) along three dimensions: size, industry, and governance. Specifically, all firms had more than 20 employees: one was a small firm (36 employees), two were medium firms (119 employees and 130 employees, respectively), and the other three were large firms (355, 498, and 4,500 employees, respectively). Moreover, firms were distributed equally between manufacturing and services industries and between family and non-family firms; one firm had a female CEO. Based on CEOs' feedback, the StiMa research group revised the questionnaire by eliminating some questions, changing others and, in general, improving the wording and the language in all the questions. Then, we *pretested* the revised version (Bartholomew and Smith 2006; Kriauciunas et al. 2011) on a sample of 31 CEOs selected among the alumni of the *Politecnico di Milano Graduate School of Business*. Although they were alumni of our school, these CEOs have no personal contact with StiMa researchers (e.g., they have never collaborated with them in prior research projects). Our choice to target the alumni of our school is in line with the literature. Scholars indeed suggest using such a strategy (Kriauciunas et al. 2011) in the critical pretest phase to ensure that a sufficient number of responses is obtained to allow a reliable evaluation of the draft questionnaire. On December 19, 2013, the 31 CEOs were invited to complete the questionnaire within the timeframe of approximately one month (by January 22, 2014). During this month, they received three reminders by email. Finally, there were 15 valid answers, producing a response rate of 48.39%. Such a high-response rate - much higher than the response rate of the survey (*see infra*) - is in line with our expectations, given the sample that we targeted. We performed a detailed analysis of these 15 responses and further improved the questionnaire.

In particular, the StiMa research group worked to enhance the clarity of questions that resulted in missing data or showed limited variability in the answers (for instance, a bias towards 3 on 5-point Likert-like scales). Finally, the final version of the StiMa questionnaire was delivered, and the survey began on February 24, 2014.

## THE DEFINITION OF TARGET POPULATION, SAMPLE FRAME, AND CONTACTED SAMPLE

### The target population

While preparing the questionnaire, the StiMa research group defined the *target population*, namely the set of firms they intended to study. It coincided with the population of Italian firms satisfying the following criteria. The firms i) operate in the manufacturing and service industries, according to the Pavitt-Miozzo-Soete (PMS) taxonomy (Miozzo and Soete 2001; Pavitt 1984)<sup>7</sup>, ii) have at least 20 employees, and iii) have a legal status that requires them to complete the balance sheet<sup>8</sup>. The researchers chose a threshold of 20 employees for two main reasons. First, they wanted to include firms whose size gives rise to a need for a stable and structured TMT. Second, they did not want to exclude small and medium enterprises, which are the backbone of the Italian productive system, thus advancing the extant research on TMTs that has mainly focused on large established firms. Moreover, researchers retained in the population only those firms that are required to complete the balance sheet<sup>9</sup> in order have performance data (e.g., return on assets, return on equity, return on sales) to study the consequences of TMTs' organizational design. The application of the aforementioned criteria led to a target population of 50,341 firms. Table 1 summarizes the distribution of the target population by number of employees, industry, and geographical location.

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<sup>7</sup> Following the PMS classification, the researchers considered the following NACE codes: science based (NACE codes 21, 26), supplier dominated (13, 14, 15, 16, 17, 18, 31, 32), scale intensive (10, 11, 12, 19, 20, 22, 23, 24, 25, 29, 30), specialized suppliers (27, 28, 33), knowledge intensive business services (62, 63, 69, 70, 71, 72, 73, 74, 90, 91), supplier dominated services (47, 55, 56, 68, 77, 78, 79, 80, 81, 82, 85, 86, 87, 88, 92, 93, 94, 95, 96), physical networks services (35, 36, 37, 38, 39, 45, 46, 49, 50, 51, 52, 53), and information networks services (58, 59, 60, 61, 64, 65, 66).

<sup>8</sup> More specifically, the researchers of the StiMa project asked the *Research Department of the Milan Chamber of Commerce* to provide them the list of all the Italian firms in the PMS industries with at least 20 employees, thus obtaining a list of 58,947 firms. Then, they excluded firms whose legal status does not force them to fill the balance sheet.

<sup>9</sup> The *legal status* of firms included in the population are: *Società a Responsabilità Limitata*, *Società per Azioni*, *Società a Responsabilità Limitata con Unico Socio*, *Società Cooperativa*, *Società per Azioni con Unico Socio*, *Società Cooperativa a Responsabilità Limitata*, *Società Consortile a Responsabilità Limitata*, *Società Consortile per Azioni*, *Piccola Società Cooperativa a Responsabilità Limitata*, *Società a Responsabilità Limitata a Capitale Ridotto*, *Società a Responsabilità Limitata Semplicata*, *Società Consortile Cooperativa a Responsabilità Limitata*.

**Table 1.** Distribution of the target population

Employees	Manufacturing industry			Services industry			Total
	North	Center	South	North	Center	South	
20-49	9,090	2,437	1,944	9,879	3,714	4,191	31,255
50-249	5,160	1,000	732	5,346	1,898	1,901	16,037
250-499	562	103	43	619	258	189	1,774
More than 500	339	67	31	528	211	99	1,275
<b>Total</b>	<b>15,151</b>	<b>3,607</b>	<b>2,750</b>	<b>16,372</b>	<b>6,081</b>	<b>6,380</b>	<b>50,341</b>

### The sample frame and the contacted sample

The StiMa research group extracted a sample from the target population to which an invitation to complete the questionnaire (i.e., *sample frame*) was sent. The sample frame consisted of 6,108 firms and was stratified along three dimensions: (i) number of employees (20-49, 50-249, 250-499, and equal to or greater than 500); (ii) industry (manufacturing and services); and (iii) geographical location (North, Center and South of Italy). Note that researchers included in the sample *all the firms* with more than 500 employees, instead of randomly extracting them. This choice was motivated by the low number of such firms (1,275 firms, 2.53% of the target population) and by their relevance for the Italian productive system and society in general. On the contrary, 4,833 firms with fewer than 500 employees were stratified, considering a confidence interval of 5% and a confidence level 95% for each stratum of the sample, thus resulting in a sample frame of 6,108 firms. Table 2 shows the distribution of the firms in the sample along the three dimensions.

**Table 2.** Distribution of the sample frame randomly extracted from the target population

Employees	Manufacturing industry			Services industry			Total
	North	Center	South	North	Center	South	
20-49	368	331	320	369	348	351	2,087
50-249	357	277	252	358	319	319	1,882
250-499	228	81	38	237	154	126	864
More than 500	339	67	31	528	211	99	1,275
<b>Total</b>	<b>1,292</b>	<b>756</b>	<b>641</b>	<b>1,492</b>	<b>1,032</b>	<b>895</b>	<b>6,108</b>

The sample frame does not coincide with the *contacted sample* that researchers contacted when administering the survey. Indeed, they needed contact information for the CEOs of the 6,108 firms in the sample frame to invite them to participate in the survey. To this end, the StiMa research group organized a team of student assistants<sup>10</sup> to search for CEOs' contact information (i.e., name and surname, email address, telephone number and LinkedIn profile). The team used

<sup>10</sup> In total, 19 master of science students worked on the StiMa project, staffed to the different activities that compose the whole data gathering process.

the following sources (priority order): Aida<sup>11</sup>, InsideView<sup>12</sup>, LexisNexis<sup>13</sup>, the firm's website and, more generally, the internet. In particular, the student assistants used Aida, InsideView and LexisNexis to identify the name and surname of CEOs, whereas the firm's website and internet served mainly to find email addresses and telephone numbers and to crosscheck information. Because the survey was administered by email (see *the administration of the survey* section for more details), the availability of CEOs' email address was mandatory. However, despite the great effort put into this activity, it was not possible to retrieve the email address of all of the CEOs in the sample frame (mainly due to privacy policies). To overcome this problem, the StiMa researchers generated the missing emails starting from the email address of another manager or employee in the same firm and replicating its structure<sup>14</sup>. However, it was not always possible to apply this procedure successfully (for instance, because it was impossible to retrieve other email addresses in the firm or because the CEOs' email generated *by analogy* turned out to be incorrect) and some CEOs in the framed sample remained without an email address. In these cases, to increase the size of the contacted sample, the team of student assistants searched for their telephone number (or for the telephone number of firm) and tried to contact them by phone. In the event that they obtained the email address of the CEO by phone, they updated the contacted sample accordingly.

Finally, the StiMa research group defined as the *contacted sample* the sample of firms for which it was possible to identify the correct email address of the CEO. This sample consists of 3,899 Italian firms. Table 3 displays the distribution of the contacted sample by number of employees, industry, and geographical location.

**Table 3.** Distribution of the contacted sample

Employees	Manufacturing industry			Services industry			Total
	North	Center	South	North	Center	South	
20-49	135	93	112	127	78	219	764
50-249	731	189	145	503	168	265	2,001
250-499	176	52	16	205	69	68	586
More than 500	148	27	13	215	89	56	548
<b>Total</b>	<b>1,190</b>	<b>361</b>	<b>286</b>	<b>1,050</b>	<b>404</b>	<b>608</b>	<b>3,899</b>

<sup>11</sup> <http://aida.bvdinfo.com>. Aida is a database that contains information and balance sheets of all the Italian firms. It is provided by Bureau van Dijk (BvD) and it is the Italian version of Orbis database (<http://orbis.bvdinfo.com>).

<sup>12</sup> [www.insideview.com](http://www.insideview.com). InsideView is a database containing information about firms all over the world (e.g., firms' contact information, name and surname of some of their top executives).

<sup>13</sup> <http://academic.lexisnexis.eu>. Lexis Nexis is a database that contains news, legal and company information (e.g., location, size, etc.) about firms all over the world.

<sup>14</sup> For instance, if the email address of the manager or employee was *name.surname@firm.com*, researchers created an email address for the CEO with her/his name dot surname and the same domain.

## THE STIMA SURVEY: ADMINISTRATION OF THE SURVEY, DATABASE CONSTRUCTION, AND CHECKS FOR DATA RELIABILITY

### Administering the survey

Once the contacted sample was identified, the StiMa researchers invited the CEOs in this sample to complete the StiMa questionnaire by sending them a dedicated email message. In addition to explaining to the CEO how s/he could complete the questionnaire and the deadline to do so, this email briefly described the project, highlighting its main objectives and its relevance for practitioners. Moreover, it illustrated the benefits for survey participants. In particular, acknowledging the importance of setting non-monetary rewards in survey data collections to increase the response rate (Yu and Cooper 1983), the StiMa researchers promised to send a synthesis of the results and a customized benchmarking to CEOs who responded to the survey. The invitation email also recalled that the StiMa research group committed to treat data confidentially and to present them only in aggregate form (thus guaranteeing anonymity, Jober and O'Reilly 1998). The invitation email included the link to complete the online questionnaire available on the SurveyMonkey platform ([www.surveymonkey.com](http://www.surveymonkey.com)) and a document describing the project in detail<sup>15</sup>.

For contacted CEOs, StiMa researchers scheduled a series of up to 10 reminders by email. The first email reminder happened after two weeks from the invitation email, the second two weeks after the first one, while the other eight reminders were sent weekly. At the same time, the team of student assistants made phone calls to CEOs to describe the project and invite them to participate. Overall, 52% of the CEOs who completed the questionnaire answered following the first reminder, and 70% had responded following the third reminder; 15% responded after six reminders. Once the CEO completed the questionnaire, the team of student assistants thanked her/him by email, saved the .pdf version of her questionnaire, and checked its completeness. It was possible to distinguish three levels of completeness based on the number of questions answered by the CEO. The questionnaires were labelled as: (i) *complete* (if the CEO completed all questions, from Q1 to Q35, see Appendix B), (ii) *partially complete* (if the CEO completed questions from Q1 to Q27), and (iii) *dropped out* (if the CEO provided just personal information by completing

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<sup>15</sup> It is worth mentioning that CEOs could alternatively fill the .doc version of the questionnaire attached to the invitation email and return it via email, mail or fax. 76 CEOs sent back the .doc file via email, only one via mail, and no one used fax. Afterwards, the team of student assistants inserted on SurveyMonkey all the .doc questionnaires to make it possible to download simultaneously all the data (see the section on *administration of the survey, database construction, and checks for data reliability*).

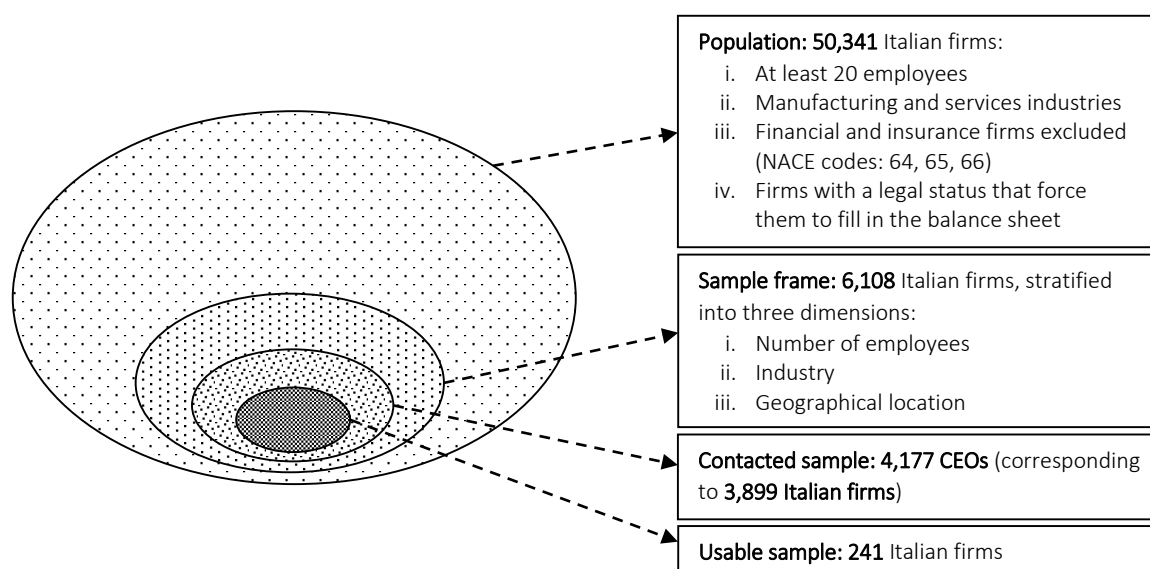


questions from Q1 to Q4). Finally, the team of student assistants carefully recorded contact information provided by the CEOs on the questionnaire, i.e., her/his email address - if different from the one used to contact her/him - and her/his telephone number. Using the CEOs' personal telephone number, they called them to retrieve missing values when present and invite CEOs to complete dropped out questionnaires.

During the survey administration, the researchers of the StiMa project created and periodically updated the *StiMa database*, engaging in a careful activity of data cleaning. Specifically, after downloading data from the SurveyMonkey platform, they adjusted the data format (e.g., converting in digit format numbers written in text format) and checked the internal consistency of the answers within each questionnaire. Moreover, at the end of the survey, StiMa researchers checked for the representativeness of the sample and for the presence of non-response biases. In addition, they crosschecked CEOs' answers through a second survey addressed to the Chief Human Resources Officers (HRs) of the firms in the sample. Finally, they collected additional data to complement and enrich the information gathered through the survey. We describe these activities in the following sections.

### The StiMa sample

In total, the StiMa project collected 363 questionnaires, 241 of which (218 complete and 23 partially complete) were usable for the purposes of the project. Indeed, for 122 questionnaires the CEOs provided only their contact information. Moreover, in eight of these 122 dropped out questionnaires, the CEO did not provide any information to identify her/him or her/his firm (i.e., they were anonymous). Consequently, the following analyses (*see infra*) consider only 114 dropped out questionnaires. Figure 1 summarizes the target population, the sample frame, the contacted sample, and the usable sample of 241 questionnaires. Table 4 shows the distribution of the usable sample along the three dimensions used to stratify the sample frame (i.e., number of employees, industry, and geographical location).



**Figure 1.** Target population, sample frame, contacted sample and usable sample

**Table 4.** Distribution of the usable sample

Employees	Manufacturing industry			Services industry			Total
	North	Center	South	North	Center	South	
20-49	14	1	5	10	4	10	44
50-249	29	12	7	25	7	11	91
250-499	23	4	3	20	1	0	51
More than 500	15	0	1	22	13	4	55
<b>Total</b>	<b>81</b>	<b>17</b>	<b>16</b>	<b>77</b>	<b>25</b>	<b>25</b>	<b>241</b>

The response rate, computed referring to the number of firms in the contacted sample - 6.18%, or 241 answers out of 3,899 contacted CEOs - may appear low at first glance, but it is in line with those of similar studies on CEOs and TMTs. For instance, Poterba and Summers (1995) obtained a 4% response rate in their survey addressed to German CEOs; more generally, no rules exist in the literature regarding the acceptable response rate in this realm (Dennis 2003). In several cases, published papers using survey data do not even report the response rate (Baruch and Holtom 2008). According to Baruch (1999), a prominent reason for the low response rates is individuals' reluctance to take part in surveys. As mentioned above, this likely holds particularly true for CEOs and TMT members, who suffer from severe time constraints. Indeed, evidence exists that the role of respondents influences the response rate (Cycyota and Harrison 2006), with lower response rates in the event of surveys addressed to top executives (e.g., CEOs, managing directors, Chief Human Resources Officers) compared to those taken on non-executive employees (Baruch 1999; Baruch and Holtom 2008; Tomaskovis-Devey et al. 1994). In addition, top executives' response rates have decreased in recent decades (Hambrick et al. 1993), probably due to the increasing time pressure that they experience. In the case of the StiMa survey, CEOs may have been reluctant

to participate for several reasons, including the length of the questionnaire (Cooper and Payne 1988), the fear of disclosing sensitive personal and firm information (Baruch and Holtom 2008), and a lack of interest in an academic project that they perceive as not having an immediate return for their firms. In preparing the questionnaire and during the survey administration, the StiMa researchers did everything possible to minimize these concerns. For instance, they cut some questions after the pilot test and the pretest of the questionnaire, allowed the CEOs to complete the questionnaire without providing information that they considered sensitive, guaranteed anonymity (as suggested by Jober and O'Reilly 1998), and promised the respondents that they would be sent a report and a personalized benchmark at the end of the survey (Yu and Cooper 1983). They also explained to respondents that the StiMa project holds the potential to bring important managerial implications.

### Representativeness

Scholars concur that in survey research the representativeness of the sample is more important than the response rate (Cook et al. 2000). The usable sample of the StiMa project behaves quite well in this regard. During the administration of the survey, StiMa researchers periodically checked the representativeness of the usable sample along the three dimensions used to stratify the sample frame: (i) number of employees; (ii) industry of operation (manufacturing vs. services); and (iii) geographical location (North, Center and South of Italy). Accordingly, they made dedicated phone calls to invite CEOs of underrepresented categories of firms (e.g., firms located in the South of Italy) to respond to the survey. At the end of the survey, researchers controlled whether the usable sample was representative of the contacted sample and of the target population using t-tests and the Kolmogorov-Smirnov test for equality of distribution functions for continuous variables (e.g., number of employees), and chi-tests for dichotomous and categorical variables (e.g., geographical location, industry).

The usable sample (241 firms) is representative of the contacted sample (3,899 firms) in terms of industry ( $\chi^2(1) = .003$ , p-value = .955). When considering the number of employees in the usable and in the contact sample, the representativeness holds comparing the average number of employees (t statistic = -.921; p-value = .357), while it is lost when comparing distributions (Kolmogorov-Smirnov statistic = .158; p-value = .000). Finally, the usable sample is not representative of the contacted one basing on the geographical location ( $\chi^2(2) = 6.655$ , p-value = .036). In particular, compared with the contacted sample, in the usable sample, there is a slightly higher number of firms located in the North of Italy and a slightly lower number of firms located

in the Center and in the South, which is probably due to proximity effects because *Politecnico di Milano School of Management* is located in the North.

The situation is different when controlling whether the usable sample is representative of the population (50,241 firms). In this case, the usable sample is representative of the industry ( $\chi^2(1) = 2.058$ ; p-value = .151) and the geographical location ( $\chi^2(2) = .910$ ; p-value = .634), but not for the number of employees, considering both the average (t statistic = -7.942; p-value = .000) and the distribution (Kolmogorov-Smirnov statistic = .473; p-value = .000). Considering the four classes of employees used to stratify the sample, it is possible to observe that the one comprising between 50 and 249 is the most represented one. Firms with at least 250 employees are over-represented, while those with fewer than 50 employees are under-represented. This may depend on the difficulties faced in finding CEOs' contact information for the smallest firms (20 to 49 employees). Indeed, considering this range of employees, the proportion of firms in the usable sample and in the contacted one is quite similar, meaning that, once their contact information became available, these CEOs did complete the questionnaire. On the contrary, the over-representation of firms with more than 250 employees may depend on the fact that researchers had more success in locating CEOs' contact information for these firms and that these CEOs were more willing to participate.

### Non-response bias

To provide further support to the StiMa project's response rate and to prevent obtaining biased estimates in future works (Armstrong and Overton 1977), the StiMa researchers checked data for non-response bias. First, they compared respondents vs. non-respondents along the dimensions used to stratify the sample frame. Then, to check for non-response bias along other relevant individual or organizational dimensions, they compared respondents in the usable sample with CEOs who dropped out of the survey, and early respondents vs. late respondents. Indeed, respondents who dropped out and late respondents can be assimilated as non-respondents. As for representativeness checks, the researchers used t-tests for equality of means and the Kolmogorov-Smirnov test for equality of distribution functions for continuous variables, and chi-tests for dichotomous and categorical dimensions.

**Respondents vs. Non-Respondents.** First, researchers considered the CEOs included in the usable sample to be respondents (241 firms) and the remaining CEOs in the contacted sample to be non-respondents (3,658 firms), including those who dropped out of the questionnaire (114 firms). Then, they moved the dropped out respondents from the non-respondent sample (3,544

firms) to the respondent one (355 firms). In both cases, they did not find any difference between respondents and non-respondents based on the industry ( $\chi^2(1) = .004$ , p-value = .952, and  $\chi^2(1) = .174$ , p-value = .676, respectively) or on the average number of employees (t statistic = -.856, p-value = .392, and t statistic = -.964, p-value = .335). However, differences were found in the distribution of the number of employees (Kolmogorov-Smirnov statistic = .173, p-value = .000, and Kolmogorov-Smirnov statistic = .187, p-value = .000, respectively) and in the geographical location ( $\chi^2(2) = 8.061$ , p-value = .018, and  $\chi^2(2) = 6.371$ , p-value = .041).

**Full Respondents vs. Dropped Out Respondents.** The StiMa researchers compared the usable sample (241 firms) and respondents who dropped out of the questionnaire (114 firms). No differences emerged between the samples considering the number of employees (both on average, t statistic = -.341, p-value = .774, and based on the distribution, Kolmogorov-Smirnov statistic = .076, p-value = .726), the industry ( $\chi^2(1) = .028$ , p-value = .868), and the geographical location ( $\chi^2(2) = 2.498$ , p-value = .287). Moreover, researchers compared full respondents and dropped out respondents along CEOs' individual characteristics. No statistically significant differences emerged when considering CEOs' gender ( $\chi^2(1) = .109$ , p-value = .741) and age (both on average, t statistic = -1.559, p-value = .120, and based on the distribution, Kolmogorov-Smirnov statistic = .156, p-value = .171), whereas differences were found in their educational background ( $\chi^2(1) = 15.290$ , p-value = .000), with a higher number of graduated CEOs in the usable sample.

**Early Respondents vs. Late Respondents.** Considering the usable sample, the StiMa researchers compared early (139 firms) and late respondents (102 firms). Late respondents are those who completed the questionnaire after three emails (i.e., the invitation email plus two email reminders). This threshold appears reasonable because after the second reminder the StiMa researchers started to implement actions to manage problems of representativeness (see the discussion above). Considering the three dimensions used to stratify the sample frame, no difference emerged based on the number of employees (considering both the average, t statistic = .280, p-value = .774, and the distribution, Kolmogorov-Smirnov statistic = .090, p-value = .726) and the industry ( $\chi^2(1) = .004$ , p-value = .948), whereas statistically significant differences were found for geographical location ( $\chi^2(2) = 15.127$ , p-value = .001). Specifically, CEOs in the North of Italy responded earlier, whereas CEOs whose firms are located in the South were the slowest ones. Again, this might have been due to their lack of proximity to the *Politecnico di Milano School of Management*. Moreover, considering CEOs' individual characteristics, there are no differences in the educational background of early and late respondents ( $\chi^2(1) = .073$ , p-value = .788), age (both

on average,  $t$  statistic = .864,  $p$ -value = .389, and considering the distribution, Kolmogorov-Smirnov statistic = .109,  $p$ -value = .486), and gender ( $\chi^2(1) = .315$ ,  $p$ -value = .547).

Following Gruber et al. (2010), the StiMa researchers also checked for biases caused by the fact that late respondents (i.e., CEOs who decided to fill in the questionnaire only after a greater number of email reminders) were less willing to take part in the survey (compared to early respondents). This indeed might have affected their responses to constructs and perceptiveness questions measured by Likert-like scales. Accordingly, the StiMa researchers checked the 13 constructs within the StiMa questionnaire (computing them as the mean of their items), and found differences between early and late respondents only for two of them, namely *tacit coordination* and *joint decision making* (see Table 5)<sup>16</sup>.

**Table 5.** Non-response bias: comparison of constructs between early respondents and late respondents

Dimension	Comparing the mean		Comparing the distribution	
	p-value	Differences	p-value	Differences
Formal coordination	.347	No	.784	No
Tacit coordination	.082	Yes*	.576	No
Ongoing communication	.637	No	.792	No
Information exchange	.371	No	.877	No
Strategic decision speed	.289	No	.907	No
Strategic decision comprehensiveness	.956	No	.898	No
Procedural rationality	.427	No	.672	No
Process rationality	.394	No	.612	No
Joint decision making	.026	Yes**	.224	No
Political behavior	.807	No	.978	No
CEO leadership	.513	No	.393	No
Trust	.664	No	.930	No
Collaborative behavior	.197	No	.734	No

Note. \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$

Then, they controlled non-response bias for the five questions based on Likert-like scales (see Table 6). Only two differences emerge from their 46 items, concerning the evaluation of CEO's variable compensation and the number of competitors in the market.

<sup>16</sup> These findings still hold when considering factors resulting from a Principal Component Analysis applied to constructs' items; the only difference is that, in this case, there are also differences in the distribution of *joint decision making*. Results are available from the authors upon request.

**Table 6.** Non-response bias: comparison of items evaluated through Likert-like scales between early respondents and late respondents

<b>Dimension</b>	<b>p-value</b>	<b>Differences</b>
<i>Question on the level of delegation (5 points Likert-like scale)</i>		
Ditem1	.740	No
Ditem2	.865	No
Ditem3	.847	No
Ditem4	.707	No
Ditem5	.907	No
Ditem6	.560	No
Ditem7	.646	No
Ditem8	.695	No
Ditem9	.664	No
Ditem10	.196	No
Ditem11	.958	No
Ditem12	.789	No
Ditem13	.489	No
Ditem14	.576	No
Ditem15	.131	No
Ditem16	.751	No
Ditem17	.102	No
Ditem18	.690	No
Ditem19	.678	No
Ditem20	.630	No
Ditem21	.606	No
<i>Question on the objective of CEO's meetings with external people (7 points Likert-like scale)</i>		
EMitem1	.354	No
EMitem2	.661	No
EMitem3	.155	No
<i>Questions on firms' sources of information (5 point Likert-like scale)</i>		
ISitem1	.150	No
ISitem2	.349	No
ISitem3	.465	No
ISitem4	.695	No
ISitem5	.962	No
ISitem6	.810	No
ISitem7	.293	No
ISitem8	.629	No
ISitem9	.989	No
<i>Question on opportunity exploitation (7 points Likert-like scale)</i>		
OEitem1	.826	No
OEitem2	.920	No
OEitem3	.180	No
OEitem4	.126	No
OEitem5	.310	No
OEitem6	.319	No
OEitem7	.585	No
OEitem8	.808	No
OEitem9	.255	No
<i>Question on the characteristics of the market (5 points Likert-like scale)</i>		
Mitem1	.532	No
Mitem2	.633	No
Mitem3	.043	Yes**
Mitem4	.899	No

Note. \*p < .10, \*\*p < .05, \*\*\*p < .01

To sum up, considering the 59 dimensions (13 constructs and 46 items) evaluated in the questionnaire through Likert-like scales, there are differences only for four of them. This suggests that non-response is not a serious concern.

### Data reliability

The StiMa project researchers devoted special attention to data reliability. First, they crosschecked non-perceptive variables and constructs concerning firms' or CEOs' characteristics using secondary sources of information (e.g., balance sheets, company charts, CEO's biographies on LinkedIn). Second, taking inspiration from Bandiera et al. (2008), they crosschecked data concerning CEOs' time management by asking respondent CEOs to provide their weekly agenda. Finally, in the main StiMa questionnaire, researchers asked CEOs for contact information (name, last name and email address) of the Chief Human Resources Officer (HRs) in their firm. Then, once the main survey ended, they sent a second questionnaire (the *HRs' questionnaire*) to these HRs. The HRs questionnaire contained a subset of questions in the main StiMa questionnaire. Specifically, it included all of the questions concerning perceptive variables and constructs evaluated through Likert-like scales, which were not possible to crosscheck using secondary sources of information. This second wave of the survey took place from July to September 2015. The StiMa researchers contacted 114 HRs by email and, after six email reminders, obtained 43 usable answers, corresponding to a response rate of 37.72%. Then, researchers matched these 43 HRs' answers with their corresponding CEOs' responses and evaluated interrater reliability. Specifically, following Danneels (2015), they compared CEOs' and HRs' data computing the Average Deviation Index (ADI, Burke and Dunlap 2002) for each item and for the 13 constructs in the questionnaire. The Stata .do file to compute the Average Deviation Index in Stata is available from the authors upon request.

Looking at the results (see Table 7 and 8), interrater agreement is acceptable for all items and constructs. Indeed, based on the reasoning of Burke and Dunlap (2002), interrater agreement is acceptable if the ADI is lower of .80 in the case of 5-point scales and 1.20 for 7-point scales.

Moreover, in the case of constructs the ADI is always lower than 1 (with the only exception of two items), meaning that the responses of CEOs and HRs differ by an average of less than 1 scale point (Danneels 2015). Differently, for the majority of items of questions that do not refer to constructs (30 items out of 43, 69.77%) it is lower than .05, meaning an average difference lower than .50 scale points.



**Table 7.** Comparison of constructs between CEOs and HRs computing the Average Deviation Index

Constructs and items	Scale	Maximum value allowed	Average Deviation Index
<i>Formal coordination</i>	7-point	1.2	.783
FCitem1	7-point	1.2	.884
FCitem2	7-point	1.2	.593
FCitem3	7-point	1.2	.872
<i>Tacit coordination</i>	7-point	1.2	.884
TCitem1	7-point	1.2	.779
TCitem2	7-point	1.2	.919
TCitem3	7-point	1.2	.860
TCitem4	7-point	1.2	.884
TCitem5	7-point	1.2	.977
<i>Ongoing communication</i>	7-point	1.2	.983
OCitem1	7-point	1.2	.826
OCitem2	7-point	1.2	1.105
OCitem3	7-point	1.2	1.081
OCitem4	7-point	1.2	.919
<i>Information exchange</i>	5-point	0.8	.395
IEmitem1	5-point	0.8	.500
IEmitem2	5-point	0.8	.337
IEmitem3	5-point	0.8	.349
<i>Strategic decision speed</i>	5-point	0.8	.574
SDSitem1	5-point	0.8	.419
SDSitem2	5-point	0.8	.802
SDSitem3	5-point	0.8	.500
<i>Strategic decision comprehensiveness</i>	5-point	0.8	.472
SDCitem1	5-point	0.8	.477
SDCitem2	5-point	0.8	.477
SDCitem3	5-point	0.8	.488
SDCitem4	5-point	0.8	.430
SDCitem5	5-point	0.8	.488
<i>Procedural rationality</i>	7-point	1.2	.605
PROCEDitem1	7-point	1.2	.651
PROCEDitem2	7-point	1.2	.570
PROCEDitem3	7-point	1.2	.593
<i>Process rationality</i>	7-point	1.2	.705
PROCESSitem1	7-point	1.2	.651
PROCESSitem2	7-point	1.2	.791
PROCESSitem3	7-point	1.2	.674
<i>Joint decision making</i>	7-point	1.2	.686
JDMitem1	7-point	1.2	.628
JDMitem2	7-point	1.2	.733
JDMitem3	7-point	1.2	.698
JDMitem4	7-point	1.2	.686
<i>Political behavior</i>	7-point	1.2	.712
PBitem1	7-point	1.2	.919
PBitem2	7-point	1.2	.605
PBitem3	7-point	1.2	.628
PBitem4	7-point	1.2	.663
PBitem5	7-point	1.2	.744
<i>CEO leadership</i>	7-point	1.2	.668
Litem1	7-point	1.2	.733
Litem2	7-point	1.2	.895
Litem3	7-point	1.2	.779
Litem4	7-point	1.2	.756
Litem5	7-point	1.2	.477
Litem6	7-point	1.2	.523

Litem7	7-point	1.2	.477
Litem8	7-point	1.2	.547
Litem9	7-point	1.2	.827
<i>Trust</i>	7-point	1.2	.544
Titem1	7-point	1.2	.523
Titem2	7-point	1.2	.407
Titem3	7-point	1.2	.535
Titem4	7-point	1.2	.686
Titem5	7-point	1.2	.570
<i>Collaborative behavior</i>	7-point	1.2	.704
CBitem1	7-point	1.2	.698
CBitem2	7-point	1.2	.709

**Table 8.** Comparison of items evaluated through Likert-like scales by CEOs and HRs computing the Average Deviation Index

Dimension	Scale	Maximum value allowed	Average Deviation Index
<i>Question on the level of delegation</i>	5-point	0.8	.363
Ditem1	5-point	0.8	.410
Ditem2	5-point	0.8	.295
Ditem3	5-point	0.8	.295
Ditem4	5-point	0.8	.385
Ditem5	5-point	0.8	.359
Ditem6	5-point	0.8	.308
Ditem7	5-point	0.8	.385
Ditem8	5-point	0.8	.410
Ditem9	5-point	0.8	.333
Ditem10	5-point	0.8	.180
Ditem11	5-point	0.8	.308
Ditem12	5-point	0.8	.372
Ditem13	5-point	0.8	.474
Ditem14	5-point	0.8	.423
Ditem15	5-point	0.8	.282
Ditem16	5-point	0.8	.295
Ditem17	5-point	0.8	.410
Ditem18	5-point	0.8	.372
Ditem19	5-point	0.8	.282
Ditem20	5-point	0.8	.539
Ditem21	5-point	0.8	.513
<i>Questions on firms' sources of information</i>	5-point	0.8	.466
ISitem1	5-point	0.8	.524
ISitem2	5-point	0.8	.393
ISitem3	5-point	0.8	.464
ISitem4	5-point	0.8	.536
ISitem5	5-point	0.8	.417
ISitem6	5-point	0.8	.476
ISitem7	5-point	0.8	.405
ISitem8	5-point	0.8	.500
ISitem9	5-point	0.8	.476
<i>Question on opportunity exploitation</i>	7-point	1.2	.612
OEitem1	7-point	1.2	.738
OEitem2	7-point	1.2	.619
OEitem3	7-point	1.2	.655
OEitem4	7-point	1.2	.512
OEitem5	7-point	1.2	.619
OEitem6	7-point	1.2	.619
OEitem7	7-point	1.2	.536

OEitem8	7-point	1.2	.643
OEitem9	7-point	1.2	.571
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<i>Question on the characteristics of the market</i>	5-point	0.8	.327
Mitem1	5-point	0.8	.262
Mitem2	5-point	0.8	.441
Mitem3	5-point	0.8	.286
Mitem4	5-point	0.8	.321
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In crosschecking CEOs' answers with HRs' answers, the StiMa researchers also verified that the first and second respondents were actually not the same person. To do this, they compared the IP address of the online questionnaires (available from SurveyMonkey) or the saving properties in the .doc questionnaires of the CEOs and the HRs, respectively. Specifically, for questionnaires that were completed online by both the CEO and the HR, the researchers checked whether the two questionnaires had different IP addresses; if so, they assumed that two different individuals completed them. In the event that both the CEO and the HR used the .doc version of the questionnaire, they controlled who saved its last version (looking at file properties); if two different persons saved the two .doc questionnaires, the researchers assumed that the CEO and the HR were two different individuals. They made this assumption also in cases where one of the two individuals completed the questionnaire online, while the other used the .doc version. Based on these assumptions, in 36 of the 43 cases (83.72%), the StiMa researchers could reasonably assume that two different individuals completed the questionnaires. In contrast, one may suspect that the same person completed the remaining seven pairs of questionnaires (16.28%). Indeed, five of them are associated with the same IP address, and the other two were saved by the same person. Nevertheless, in the first case, the CEO and the HR may have used the same PC to fill in the questionnaire. In the second case, the CEO may have given instructions to the HR to complete the questionnaire on her or his behalf. At any rate, as a robustness check, the StiMa researchers computed ADI by excluding these seven suspicious pairs of questionnaires. The results are in line with those obtained with the complete sample and are available from the authors upon request.

### ADDITIONAL DATA COLLECTION

To gain a comprehensive understanding of TMTs' organizational design, the StiMa researchers complemented data obtained through the StiMa questionnaire with additional data from secondary sources. Specifically, these data refer to both the firm level and the individual level of top executives. In developing the StiMa project, the researchers planned to use these data both as explanatory variables (e.g., relating CEOs' functional experience to delegation of decision authority, Colombo et al. 2016) and as control variables. In particular, an accurate choice of control

variables is of prominent importance in studies on firms' organizational design due to the multiple confounding factors that may influence firms' and teams' organization (Colombo and Delmastro 2008).

For *individual level data*, some StiMa researchers asked CEOs to send them their biographies and the biographies of their TMT members with the aim of retrieving from them top executives' individual characteristics (focusing in particular on educational background and work experience). In cases where the CEO did not send the biographies, the StiMa researchers downloaded them from LinkedIn or searched them on the internet, taking advantage of the fact that, in one of the questions (Q8), the CEOs were asked to report the name and surname of the TMT members<sup>17</sup>. In total, StiMa researchers successfully collected 198 CEOs' biographies out of 241 (82.16%) and 917 biographies of the managers who report directly to the CEO of the firms (including 741 TMT members) out of the 1,283 managers for whom names and surnames were available (71.47%). Retrieving individual level data from biographies has become an established procedure in the literature on top executives (e.g., Aghasi et al. 2015), and the research group coded biographies to systematize individual characteristics of CEOs and TMT members (e.g., educational background, work experience, and decision-specific knowledge).

In addition, researchers also administered to CEOs a psychometric test to measure their narcissistic personality trait. Specifically, the authors of this paper asked the 241 CEOs in the StiMa sample to complete the Narcissistic Personality Inventory (NPI, Raskin and Terry 1988), which is the gold standard for measuring narcissistic traits (e.g., Andreassen et al. 2012; Bianchi 2014; O'Reilly et al. 2014; Petrenko et al. 2015). The NPI consists of 40 paired statements representing a narcissistic self-view versus a non-narcissistic self-view (see Raskin and Terry 1988 for a description of the NPI). The literature considers this information particularly difficult to gather, to the extent that researchers have developed measures of narcissism based on indirect and unobtrusive methods (e.g., Chatterjee and Hambrick 2007, 2011; Gerstner et al. 2013; Patel and Cooper 2014). However, the data from these measures are less reliable than those obtained from psychometric tests (Chatterjee and Hambrick 2007). Once the NPI administration concluded, we obtained a sample of 202 CEOs for which we have NPI data. It is worth noting that 83.81% of the CEOs completed the NPI, thus demonstrating considerable interest in these aspects among the community of practitioners. These 202 CEOs are representative of the StiMa sample based on

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<sup>17</sup> To find biographies on LinkedIn, StiMa researchers searched for the top executive's names and surnames. Then, they checked to have found the right person by looking at the information provided on her/his work experience.

their age, gender, geographical area of birth (i.e., North, Center, and South of Italy), educational background, and tenure. Moreover, no difference emerges as to the aforementioned dimensions when comparing respondents vs non-respondents, and early respondents vs. late respondents (i.e., those who answered after receiving the first reminder).

Apart from collecting TMT level and individual level data, we integrated the database with *firm level data*. In this respect, a remarkable advantage of referring to the Italian context is that Italian limited liability firms must complete the balance sheet, which is then publicly available. Therefore, the StiMa researchers downloaded balance sheets from the Aida database to collect data on firms' financial performance from 2005 to 2013 (e.g., sales, return on assets, return on sales, return on equity, EBITDA) and governance structure (e.g., whether the firm is a subsidiary, the composition of the Board of Directors).

The result of this massive data collection, which took advantage of different sources, is a comprehensive database spanning different levels of analysis (i.e., individual level, TMT level, and firm level). Figure 2 summarizes the structure of the database. It is worth noting that we plan to complete the database through an additional data collection on top executives' physical appearance. Specifically, we plan to collect photographs of CEOs and TMT members and analyze them through a dedicated software that provides indexes of physical attractiveness and similarities. Indeed, an emerging research stream is relating the physical appearance of top executives to their firms' performance and strategies (e.g., Halford and Hsu 2014; Rule and Ambady 2008, 2009). Our aim is to investigate whether these aspects influence TMT's organizational design.

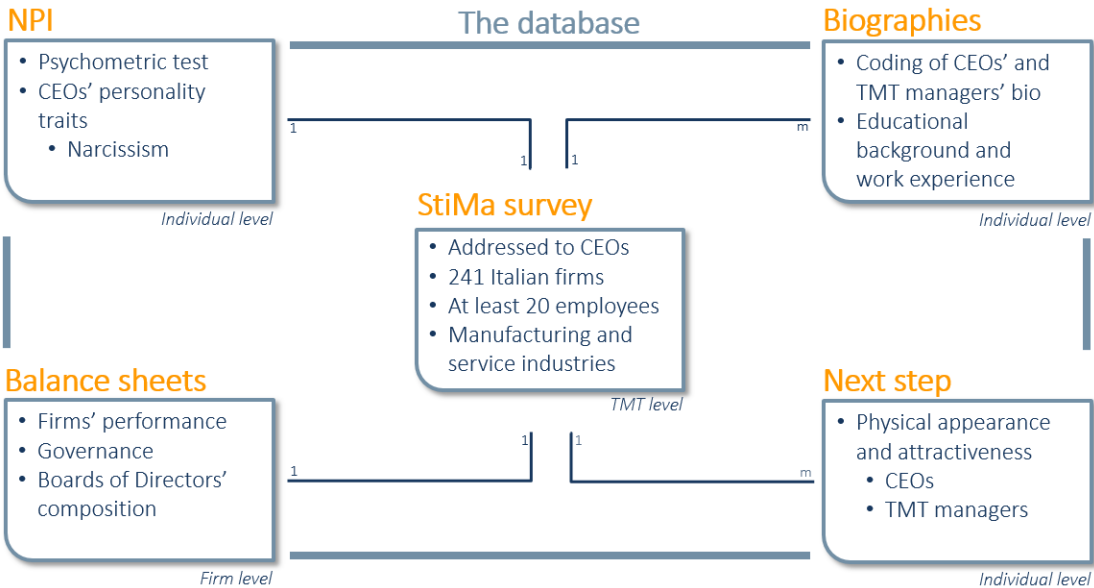


Figure 2. Structure of the database

## CONCLUDING REMARKS: LESSON LEARNT AND GOOD PRACTICES FROM THE EXPERIENCE OF THE STIMA PROJECT

No one can deny that properly designing the organization of the hierarchical apex of the firm, where strategies are defined and strategic decisions are made, is fundamentally important for achieving superior performance (Hambrick 2007). Consequently, organizational design and TMT scholars should devote effort to study how CEOs and TMT members organize their managerial labor and decision-making processes. However, the difficulties in gaining access to organizational design data at the TMT level hamper the heeding of this call. Indeed, these data are usually not available from secondary sources, especially in the case of unlisted firms and non-US firms. In most cases, the only viable way to gather good quality data is to design a survey and address it to the key informants within the firm (i.e., the CEO and the TMT members, Cycyota and Harrison 2006; Norburn and Birley 1988). Then, researchers can consider the option of complementing survey data with data from secondary sources, including firms' balance sheets and top executives' biographies. Moreover, they can administer psychometric tests to TMT members to assess their personality traits. Based on these data, researchers can, indeed, compute meaningful dependent, explanatory and control variables, thus setting up rigorous empirical studies, which can significantly contribute to academics' and practitioners' conversations on TMTs.

However, engaging in data collection on TMTs' organizational design poses numerous challenges. Researchers who do not pay sufficient attention to them run the risk of collecting poor quality data. Studies based on these data may lead to erroneous conclusions and thus offer incorrect advice to top executives on relevant managerial problems, thus being particularly detrimental for firms' performance and ultimately for the entire productive system.

To help avoid this risk, the present paper offers scholars good practices, which we hope will help in designing and improving survey researches on the TMTs' organizational design. These good practices are based on the lessons that we learned when working on the StiMa project, which compiled a comprehensive database on the organization of Italian TMTs. We hope that these lessons and good practices pave the way to further rigorous empirical research in this realm.

*Good practice 1 – Developing a good questionnaire.* Everybody knows that creating a good questionnaire is the *sine qua non* condition for collecting valuable survey data. To this end, using constructs and questions already defined and validated in the literature usually pays off. However, researchers must adapt these questions and constructs to the context of their respondents (e.g.,

the StiMa researchers adapted questions developed for US top executives to the Italian context). Carefully *pilot testing* the questionnaire on few key informants is of great help in performing such adaptation successfully. One should select these key informants according the principle of the *maximum variation*, i.e., by forming a group that is heterogeneous along a set of relevant dimensions (e.g., StiMa researchers included in this group CEOs of family vs. non-family firms, small vs. large firms). Then, a *pretest* should follow. Researchers often skip this phase, but it can offer interesting insights, especially from the observation of the pattern of missing data. The pretest should involve a sample with the same characteristics of the target population, but that it is easy to contact and mobilize, due, for instance, to the existence of prior contacts (e.g., university alumni).

*Good practice 2 – Rigorously defining the target population, the sample frame, and the contacted sample.* While creating the questionnaire, researchers should define their target population by carefully considering where the phenomenon under investigation is salient. For instance, in case of the StiMa project, researchers excluded firms with fewer than 20 employees as these firms rarely have a structured TMT that is worth studying. From the target population, researchers then extract the sample frame. This extraction is usually made at random by stratifying the sample along relevant dimensions (in case of the StiMa project, firms' size, geographical location, and industry of operation). In this phase, researchers should consider oversampling segments of the population where the phenomenon under investigation is particularly interesting. In the case of the StiMa project, researchers included in the sample frame all the firms with more than 500 employees due to their great impact on the Italian productive system, which makes their TMTs' organization worthy to study. The sample frame often does not coincide with the contacted sample due to difficulties in retrieving contacts of potential respondents. This holds particularly true in the case of surveys on top executives. Retrieving reliable contacts is the next step toward a successful survey. When the survey is administered by email, a possible strategy, which StiMa researchers applied successfully, consists of creating the unavailable email contacts *by analogy* based on the email contacts of other organizational members (see *the sample frame and the contacted sample* section).

*Good practice 3 – Professionally administering the survey.* Another critical phase of a survey is its administration, meaning getting in contact with target respondents and obtaining their participation. Online surveys are more and more diffused; however, in the case of surveys of top executives, who are usually poorly inclined to participate in surveys, it may be worth allowing the

questionnaire to be completed and submitted in different ways (e.g., not only online but also by email, fax, or mail). Researchers should not be worried about scheduling multiple reminders: 21.93% of the CEOs in the StiMa project answered with at least five reminders and 14.04% even after seven reminders. Some simple tricks in scheduling reminders may help raise the response rate. Although it is obvious that researchers must carefully track reminders to avoid soliciting executives who have already responded, they should not forget to change the day on which they send reminders. Indeed, top executives might have different habits and working schedules and might be less busy on a specific day of the week. Changing the day of sending maximizes the probability of getting in contact with top executives on a day in which they have more time to answer the questionnaire. Finally, researchers should remember to incentive participation by promising something in return for a completed questionnaire, such as a personalized benchmark, which positions the firm with respect to other firms in the industry.

*Good practice 4 – Creating a comprehensive dataset by combining different sources of data.*

When the questionnaire has many questions and items and the sample is large, researchers should consider beginning data cleaning during data collection (e.g., every 50 responses). In so doing, data collection becomes more manageable, and it is easier to check responses and recover missing data. Moreover, such a procedure allows for monitoring the representativeness of the sample. If, during the data collection process, researchers realize that some classes of respondents are under- or over-represented, they should selectively solicit responses by dedicated phone calls. Researchers should repeat the data checks at the end of the survey, controlling, particularly for the representativeness of the sample and for the presence of non-response bias. In this paper, we presented how StiMa researchers performed these analyses. Specifically, in controlling for non-response bias, they focused not only on the conventional dimensions (e.g., number of employees, geographical location, and industry) but also on the top executives' characteristics, such as educational background or age. Because these information are usually not available for non-respondents, researchers can compare early respondents with dropped out and late respondents who are likely similar to non-respondents (see, e.g., Gruber et al. 2010, for a similar approach). Finally, it is fundamental to also check responses with secondary data (when possible) or second-informants by sending a dedicated questionnaire to another manager in the firm. This allows the reliability of collected data to be tested, thus improving the quality of future studies based on them. Finally, it is of fundamental importance to integrate the data collected through the survey with other data available from secondary sources, such as those on top executives' individual



characteristics and firms' financial and innovation performance. The result is a *comprehensive and well-structured database* (see page 31), which spans different levels of analysis and can be the basis for a rigorous and long-lasting stream of studies. To this end, researchers can currently rely not only on commercial databases (e.g., Amadeus<sup>18</sup> or CorpTech) but also on social networks, which are becoming an invaluable source of information: LinkedIn contains top executives' biographies, while Facebook can help in constructing their network of relations.

As with any other research, this paper has limitations, which open up avenues for further research. First, we develop good practices to design survey data collection by discussing the case of the StiMa project, which focuses only on the Italian case. This may call into question the generalizability of the good practices resulting from the experience of the StiMa project to surveys with a larger sample size or taken on other countries. Moreover, besides being in line with the literature, the StiMa sample is not very large. Having relatively few respondents allows scholars to develop strong ties with them and to leverage these ties for collecting data that are usually not easy to obtain. Data on top executives' personality traits are a case in point, as they should be collected through psychometric tests, but difficulties in the administration to this particular target population lead researchers to use indirect, unobtrusive, and less reliable methods (e.g., Chatterjee and Hambrick 2007, 2011; Gerstner et al. 2013; Patel and Cooper 2014). Another leading-edge area of research concerns top executives' physical appearance, which has proven to influence firms' performance and strategies (e.g., Halford and Hsu 2014; Rule and Ambady 2008, 2009). Accordingly, based on their strong contacts with respondents, StiMa researchers intend to collect photographs of CEOs and TMT members in their sample and to process them through a dedicated software that computes several indexes of physical attractiveness and similarities. Such an effort is manageable due to the limited sample size of the StiMa project; i.e., it is possible to identify and thus (potentially) collect the photos of 241 CEOs and 1,283 top managers.

Second, some constructs measured thorough the StiMa questionnaire have a low Cronbach's alpha. Researchers using the StiMa data should consider this issue in future studies. Moreover, we advise scholars who intend to use these constructs in their surveys on top executives to evaluate this choice carefully.

Finally, the StiMa survey collected cross-sectional data. Accordingly, this paper offers limited insights to scholars who intend to collect time-variant data on TMTs' organizational design. StiMa

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<sup>18</sup> <https://amadeus.bvdinfo.com>

researchers are well aware of the endogeneity and reverse causality problems related to the use of cross-sectional data. Currently, they do not plan to repeat the survey in the near future; however, they collected time-variant information on CEOs' and TMT members' life patterns by using their social security ID and coding their biographies. In Italy, it is possible to obtain the social security ID of top executives from Telemaco<sup>19</sup>, which is a repository of information about Italian firms and their top executives. This ID contains the code of the municipality where the top executive was born and (likely) grew up. The literature has shown that the characteristics of the area where entrepreneurs and managers grew up can influence their current behavior (e.g., Guiso et al. 2015). From biographies, it is possible to follow the evolution of CEOs' and TMT members' careers and study whether careers depend on individual characteristics, as for instance a narcissistic personality, which induces managers to fight for top-ranking positions.

Despite these limitations, the availability of the unique database created through the StiMa project opens interesting avenues for further research on TMTs' organizational design, in which StiMa researchers are active. First, thanks to the availability of data on the main organizational design elements at the TMT level, it is possible to study them considering their complementarities (Ennen and Richter 2010) and identifying whether configurations of organizational design elements exist at this level (see Spina et al. 2015). Second, the data allow a deep understanding of the antecedents and consequences of organizational design elements within the TMT. For instance, the availability of detailed information on the allocation of authority over a comprehensive set of strategic decisions (see Appendix B) and of individual level data on CEOs' and TMT members' competences and educational background offers the opportunity to fill relevant gaps in the literature on delegation. Specifically, most of the works in this research strand have the firm, plant, or specific functions within the firm as the level of analysis (Acemoglu et al. 2007; Colombo and Delmastro 2008; Graham et al. 2015). The availability of the aforementioned data allows light to be shed on the drivers of the choice of delegation vs. centralization at the top of the hierarchy, also highlighting the role of decision and individual level factors (e.g., Colombo et al. 2016). For instance, we are currently developing a paper studying whether the choice of the Board of Directors to delegate a strategic decision to the CEO depends on her/his gender. We move from the premise that gender stereotypes may influence the Board of Directors' perception of loss of information and loss of control, thus rendering delegation less likely (Colombo et al. 2016b). In addition, we theoretically discuss and empirically assess how some CEO's characteristics

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<sup>19</sup> <https://telemaco.infocamere.it/>

(i.e., holding an MBA and having the work experience in the decision domain) weaken the effects of gender stereotypes. In a companion study (Colombo et al. 2016a), we focus on the allocation of decision authority by the CEO to TMT members. In this case, the central tenant of our research is that the decision-specific knowledge of both the CEO and the manager (which we gathered from their biographies) and the CEO's workload matter in the decision of delegation vs. centralization. Lastly, we can rely on our database to study whether and how the organizational design of the TMT impacts firm's performance. In so doing, we complement the long-running debate on the performance impact of the demographic characteristics of TMT members (e.g., Bantel and Jackson 1989; Boeker 1997; Carpenter and Friedrichson 2001; Eisenhardt and Bourgeois 1988; Hambrick 2007).

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## APPENDIX A

**Table 9.** Description of the constructs included in the questionnaire

Construct	Item	Scale	Source	Cronbach's alpha
Formal coordination	FCitem1	7-point Likert-like scale	Adapted from Foss et al. (2013)	.556
	FCitem2			
	FCitem3			
Tacit coordination	TCitem1	7-point Likert-like scale	Adapted from Srikanth and Puranam (2011)	.854
	TCitem2			
	TCitem3			
	TCitem4			
	TCitem5			
Ongoing communication	OCitem1	7-point Likert-like scale	Adapted from Srikanth and Puranam (2011)	.839
	OCitem2			
	OCitem3			
	OCitem4			
Information exchange	IEitem1	5-point Likert-like scale	Adapted from Simsek et al. (2005)	.757
	IEitem2			
	IEitem3			
Strategic decision speed	SDSitem1	5-point Likert-like scale	Souitaris and Maestro (2010)	.474
	SDSitem2			
	SDSitem3			
Strategic decision comprehensiveness	SDCitem1	5-point Likert-like scale	Souitaris and Maestro (2010)	.905
	SDCitem2			
	SDCitem3			
	SDCitem4			
	SDCitem5			
Procedural rationality	PROCEDitem1	7-point Likert-like scale	Adapted from Dean and Sharfman (1996)	.783
	PROCEDitem2			
	PROCEDitem3			
Process rationality	PROCESSitem1	7-point Likert-like scale	Adapted from Clark and Magitti (2012)	.318
	PROCESSitem2			
	PROCESSitem3			
Joint decision making	JDMitem1	7-point Likert-like scale	Adapted from Simsek et al. (2005)	.772
	JDMitem2			
	JDMitem3			
	JDMitem4			
Political behavior	PBitem1	7-point Likert-like scale	Adapted from Dean and Sharfman (1996)	.515
	PBitem2			
	PBitem3			
	PBitem4			
	PBitem5			
CEO leadership	Litem1	7-point Likert-like scale	Adapted from Gronn (2002)	.819
	Litem2			
	Litem3			
	Litem4			
	Litem5			
	Litem6			
	Litem7			
	Litem8			
	Litem9			
Trust	Titem1	7-point Likert-like scale	Adapted from Simons and Peterson (2000)	.859
	Titem2			
	Titem3			
	Titem4			
	Titem5			

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Collaborative behavior	CBitem1 CBitem2	7-point Likert-like scale	Adapted from Simsek et al. (2005)	.811
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## APPENDIX B

The 35 questions of the StiMa questionnaire are grouped in seven sections with different units of analysis. Specifically, section 1 (*personal information*) and section 6 (*CEO's time management*) focus on the individual level of the CEO, while sections 2 (*organizational structure*), 3 (*decision-making process*), 4 (*coordination mechanisms*), 5 (*human resource management*) and 7 (*general information*) relate to the firm and TMT level. In addition, the researchers of the StiMa project also asked for contact information (e.g., name, surname, and email address) of five TMT members. In the case of the Chief Human Resources Officer, they used this information to check CEO's responses reliability (see the *data reliability* section). Table 10 reports the seven sections of the questionnaire, the number of questions included in each section, their unit of analysis and the references to the sources of these questions. In the following the main questions regarding organizational design elements used in the StiMa questionnaire are reported (the complete version of the StiMa questionnaire is available from the authors upon request). When applicable, sources of the questions are indicated in brackets.

**Table 10.** Structure of the questionnaire

Section	Number of questions	Unit of analysis	References
1 Personal Information	4 (Q1 - Q4)	CEO	
2 Organizational Structure	5 (Q5 - Q9)	Firm	Guadalupe and Wulf 2008; Rajan and Wulf 2006; Foss et al. 2013
3 Decision-Making Process	7 (Q10 - Q16)	Firm CEO TMT	Bloom et al. 2012; Colombo and Delmastro 2008; Clark and Magitti 2012; Dean and Sharfman 1996; Gronn 2002; Souitaris and Maestro 2010
4 Coordination Mechanisms	4 (Q17 - Q20)	TMT	Dean and Sharfman 1996; Simons and Peterson 2000; Simsek et al. 2005; Srikanth and Puranam 2011
5 Human Resource Management	2 (Q21 - Q22)	TMT	WERS 2011
6 CEO's Time Management	5 (Q23 - Q27)	CEO	Bandiera et al. 2012
7 General Information	8 (Q28 - Q35)	Firm	CIS; Foss et al. 2013; GRI 2013

**Q5.** Indicate which organizational structure best describes your firm. Choose one of the following alternatives:

- Functional (organizational units at the first hierarchical level are Functional Department, i.e., Manufacturing department, R&D department, Sales department, Marketing department).

- Divisional (organizational units at the first hierarchical level are Business Units/Divisions, i.e., geographical business units, product-market business units)
- Hybrid, in part functional and in part divisional organizational units
- Matrix: each person/organizational unit responds to more than one hierarchical manager, depending on the type of activity or decision.

**Q6.** Indicate the largest number of hierarchical levels between the CEO and the last level with budget or expense responsibility (Guadalupe and Wulf 2008).

**Q7.** Indicate the number of managers who report directly to the CEO. Note: in the following, we will refer to them as the first lines (Guadalupe and Wulf 2008).

**Q8.** Indicate which of the following roles are present in the firm. For each role, indicate whether it belongs to the first line. Further, indicate whether the manager who holds the role: i) is a member of the Top Management Team (TMT) and since which year she belongs to it and ii) is a member of the family that owns the firm.

Roles (adapted from Rajan and Wulf 2006): General Manager; Chief Financial Officer; Chief Administrative Officer; Chief Strategy and Business Development Officer; Chief Technology Officer/R&D Officer; Chief Marketing Officer; Chief Sales Officer; Chief Purchasing Officer; Chief Supply Chain Officer; Chief Production Officer; Chief Human Resource Officer; Chief Legal and Regulation Officer; Chief Information Officer; Chief Sustainability (Environmental, Corporate Social Responsibility) Officer.

**Q9. Formal coordination** (Foss et al. 2013).

Indicate how often your firm uses the following organizational mechanisms (1 = never; 7 = very often):

- Formal committees involving different TMT members
- Temporary cross-functional work groups involving TMT members
- Coordination roles between two or more Functional Departments or Divisions

**Q10. Strategic decision comprehensiveness** (Souitaris and Maestro 2010).

Facing relevant and not ordinary opportunities and threats, indicate how often TMT members (1 = very rarely; 5 = always):

- Develop several possible alternative solutions

- Consider several drivers and points of view before taking decision
- Deeply analyze the different reasons of the threats or opportunities
- Evaluate the action plan from various points of views
- Explore many different reactions to the opportunity or the threat

**Q11. Allocation of decision authority** (adapted from Colombo and Delmastro 2008).

Indicate the lowest hierarchical level that typically has the authority to make the following decisions. Please use the following scale: 1 = The decision is made by the CEO's corporate superior (i.e., board of directors or CEO of parent company); 2 = CEO makes the decision; 3 = First line makes the decision, but formal authorization by the CEO is always required; 4 = First line makes the decision autonomously (i.e., no formal authorization is needed); 5 = Middle manager (i.e., plant manager, regional manager, BU directors) makes the decision, formal authorization by her/his superior is eventually required.

- Developing innovative products and services
- Introducing significant changes in products and services
- Developing sustainable products (environmentally friendly or socially oriented)
- Introducing major changes in marketing activities
- Entry or exit decisions from markets/product lines
- Major price decisions
- Radical changes in organizational processes and organizational procedures
- Significant changes in the organizational structure
- Strategic alliances/partnership with other firms or organizations (acquisitions and joint venture are not included)
- Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)
- Hiring, firing, promotions, salaries and incentives for middle management
- Labor disputes with unions
- (Re)design of management control systems (e.g., planning, budgeting, controlling)
- Main financing decisions (e.g., choice of capital providers, relations with the banking system)
- Strategic decisions about purchases (e.g., major supplier selection)
- Strategic decisions about production insourcing/outsourcing

- Expansion of production capability, expansion and modernization of production equipment and plants
- Significant investments in information and communication systems
- Definition of the sustainability strategy for the improvement of the work conditions (e.g., employee empowerment, health and safety programs, training, diversity and equal opportunities management)
- Definition of the sustainability strategy for the civil society development (e.g., local community development, anti-corruption practices)
- Definition and implementation of environmental initiatives (e.g., reduction of consumption or recycling of raw materials, energy and water, reduction of emissions and wastes)

**Q12.** Does a maximum budget exist for expenses/investments that allows the CEO to take decisions autonomously? If yes, what is the amount of this budget? (Adapted from Bloom et al. 2012).

**Q13. Procedural rationality** (adapted from Dean and Sharfman 1996) and **process rationality** (Clark and Magitti 2012).

Referring to the decision making process within the TMT, evaluate the following sentences.

- The TMT invests time and resources to search all relevant information before making decisions (1 = limited investment; 7 = intensive investment)
- The TMT invests time and resources to carefully analyze all the relevant information (1 = limited investment; 7 = intensive investment)
- The TMT uses sophisticated techniques of quantitative analysis in making decisions (1 = never; 7 = always)
- Does the TMT commonly make decisions following primarily an analytical approach or an intuitive approach? (1 = primarily analytical; 7 = primarily intuitive)
- Does the communication between the TMT members occur primarily in writing or in verbal form? (1 = primarily in written form; 7 = primarily in verbal form)
- Are tools such as meeting agendas and minutes important elements of TMT decision making? (1 = Not very important; 7 = very important)

**Q14. Strategic decision speed** (Souitaris and Maestro 2010).



Indicate whether you agree with each of the following sentences (1 = strongly disagree; 5 = strongly agree). The members of the TMT:

- Believe that, when making strategic decisions, rapidity is very important
- In making strategic decisions, prefer and tend to use all the time required for an accurate evaluation
- Believe that rapidity is very important when defining strategies

**Q15. CEO leadership** (adapted from Gronn 2002).

Indicate how often you meet the members of the TMT to (1 = very rarely; 7 =always):

- Discuss the problems of the firm
- Help them to solve the problems of the firm
- Discuss the goals of the firm
- Discuss the outcomes of the firm

**Q16. CEO leadership** (adapted from Gronn 2002)

Indicate whether you agree with each of the following sentences (1 = strongly disagree; 5 = strongly agree).

- Both TMT members and I are able to clearly describe the vision of the firm
- In our firm, it is expected that all organizational units reach high levels of result
- When implementing changes, both TMT members and I refer to a set of shared values
- I created an organizational structure that encourages TMT members to take part in the process improvement
- Informal leaders play an important role for change effectiveness

**Q17. Tacit coordination and ongoing communication** (adapted from Srikanth and Puranam 2011).

Indicate how much effort your firm devotes to the following actions to facilitate the interaction between the TMT members (1 = no effort; 7 = very high effort).

- To organize team building activities that allow members of the TMT to develop a common vision and mutual understanding (e.g., participation in ad-hoc social events, such as dinners and aperitifs)
- To help TMT members to understand the decisions of the other TMT members

- To organize training initiatives for members of the TMT on remote collaboration tools (e.g., Google Docs, Dropbox, Zoho, social media)
- To encourage meetings among TMT members to understand how to work better together
- To encourage the sharing of a common language among the TMT members
- To promote the exchange and sharing of working experiences among TMT members
- To develop/adopt a dedicated communication network (e.g., a corporate intranet)
- To adopt electronic tools for remote collaboration among the TMT members (e.g., Google Docs, Dropbox, Zoho, social media)
- To use electronic tools for remote communication between members of the TMT (e.g., instant messaging, Skype, Lync, Webex)

**Q18. Trust** (adapted from Simons and Peterson 2000) and **collaborative behavior** (adapted from Simsek et al 2005).

Assess how frequently (1 =very rarely; 7 = always) TMT members:

- Expect transparency from the other TMT members
- Help each other when the workload is particularly high
- Show moral integrity
- Have confidence in the skills of the other TMT members
- Help each other to meet deadlines
- Rely on the other TMT members to meet commitments
- Know they can trust the other TMT members

**Q19. Information exchange** (adapted from Simsek et al. 2005).

Consider when the TMT has taken important decisions for the future of the firm in the last two years and assess (1 = poor; 5 = high):

- The creativity of the solutions proposed by TMT members
- The quality of the solutions proposed by TMT members
- The high number of ideas exchanged between the TMT members

**Q20. Joint decision making** (adapted from Simsek et al. 2005) and **political behavior** (adapted from Dean and Sharfman 1996).

Evaluate how frequently (1 = very rarely; 7 = always):

- TMT members talk to each other about the impact of their work on that of the other TMT members
- The decisions taken by the TMT are the result of the exercise of authority among the TMT members
- TMT members usually talk about what they expect from other TMT members
- The decisions taken by the TMT are the result of the negotiation between the TMT members
- TMT members explicit their preferences in decisions to other TMT members
- TMT members have a clear understanding of the common problems
- TMT members have a clear understanding of the needs of other TMT members
- The decisions made by the TMT are the result of the ability of TMT members to influence other TMT members
- TMT members are geared toward their personal goals rather than to those of the organization

**Q21.** Referring to the annual compensation package of the CEO and TMT members, on average, what portion of the salary has been represented by variable compensations in the past three years (including variable bonuses according to pre-established targets, stock options, profit sharing, etc.)? 0%; 0%-10%; 10%-20%; 20%-30%; 30%-50%; more than 50%.

**Q22.** Which of the following statements best describes the approach of your firm in filling vacancies in the first lines? (Adapted from WERS 2011).

- Internal employees are the typical source, no external recruitment, except for rare exceptions
- Ceteris paribus, internal employees have priority over external candidates
- The internal and external candidates are treated equally
- Ceteris paribus, external candidates are preferred compared to internal employees
- External candidates are the typical source, no internal recruitment, except for rare exceptions

**Q23.** Considering a typical working week and made 100 the total time at your disposal, indicate in percentage terms how much time you spend on average (adapted from Bandiera et al. 2012):

- With the only members of the TMT

- With TMT members together with first lines and/or mid-level managers and/or with other employees
- With people inside the firm and non-members of the TMT (e.g., frontline managers not included in the TMT, middle managers, other staff)
- With people outside your firm (e.g., customers, suppliers, consultants)
- Working alone
- In other activities, please specify.

**Q24.** Made 100 the total time you spend with people inside your firm (including TMT members), allocate in percentage terms the average time spent per week in group meetings and bilateral meetings (adapted from Bandiera et al. 2012).

**Q25.** Made 100 the total time you spend with people outside your firm, allocate in percentage terms the average time spent per week in meetings with (adapted from Bandiera et al. 2012):

- External consultants
- Staff of other firms (e.g., customers, suppliers, competitors)
- Journalists and/or conferences and other public relations events
- Labor unions
- Staff of government agencies or regulators
- Shareholders and/or ownership
- Lenders (e.g., banks, venture capitalists)
- Other entities external to the firm

**Q26.** Indicate how frequently the meetings with people outside your firm are about the following activities (1 = very rarely; 7 = always) (adapted from Bandiera et al. 2012):

- Negotiate and close deals
- Communicate the image and mission of your firm
- Explore business opportunities

ANNEX 1

# Women at the Top: The Effect of CEO's Gender on the Allocation of Decision Authority by the Board of Directors

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## ABSTRACT

A wide literature has studied the allocation of decision authority highlighting its central role in firms' organizational design. At the same time, scholars have put a growing effort in studying individual characteristics and how these shape organizations. In this paper, we integrate these two literature strands and study whether and how a prominent individual characteristic, i.e. gender, influences the allocation of decision authority over strategic decisions by the Board of Directors to the CEO. We contend that gender stereotypes render less likely that decision authority is delegated by the board to female CEOs, but this effect is weakened by the generic managerial and decision-specific knowledge possessed by the CEO. We test our hypotheses on 3,198 strategic decisions taken by 188 Italian firms. In line with our hypotheses, we find that the board is less likely to delegate a strategic decision to the CEO when the CEO is a woman, but this negative "gender" effect disappears if the female CEO holds an MBA or has substantial decision-specific knowledge.

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<sup>1</sup> Authors are in alphabetical order.



## INTRODUCTION

Allocation of decision authority, i.e. whether decision authority is centralized or delegated downward the organizational hierarchy (Aghion & Tirole, 1997; Hempel, Zhang, & Han, 2012; Lin & Germain, 2003. See Colombo & Delmastro, 2008, Chapter 4, for a review), is one of the key dimensions of organizational design (Aghion & Tirole, 1997; Hayek, 1945; March & Simon, 1958). Accordingly, scholars have devoted considerable attention to understand what determines the allocation of decision authority within firms (Colombo & Delmastro, 2008; Jensen & Meckling, 1992). These studies have highlighted that delegation helps to make the best use of the knowledge and information distributed within the firm (Acemoglu et al., 2007; Hayek, 1945; Jensen & Meckling, 1992), improves the motivation, creativity, initiative and effort of those employees to whom the decision authority is delegated (Benabou & Tirole, 2003; Gagné & Deci, 2005), and protects the time of senior managers from information overload (Garicano & Rossi-Hansberg, 2006; Harris & Raviv, 2005). In so doing, delegation helps in empowering them (Hempel et al., 2012), thus leading to higher job satisfaction, organizational commitment, task performance, and innovative behavior (Chen & Aryee, 2007). As a consequence, delegation ultimately has a positive effect on firm's efficiency (Harris & Raviv, 2005) and performance (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Lin & Germain, 2003). However, delegation of decision authority may also entail drawbacks as the loss of control over decisions, which indicates a deviation of the agent's actions from the objectives of the principal (Colombo & Delmastro, 2008; Dessein, 2002).

Drivers of delegation are the environment faced by the firm, meaning both the geographical location (Bloom et al., 2012) and the industry (Acemoglu et al., 2007; Lin & Germain, 2003), and the information, knowledge, and skills of the individuals involved. Specifically, the probability that a principal delegates decision authority to an agent increases the more the latter is knowledgeable (Harris & Raviv, 2005). Indeed, by co-locating knowledge and decision authority, it is possible to use efficiently the individual-specific knowledge (Hayek, 1945) and the time of individuals: in line with their level of knowledge, less informed individuals dedicate their time to routine and easy problems, while more skilled individuals deal with difficult problems (Garicano & Rossi-Hansberg, 2006).

Apart from the interest in the role of knowledge, the delegation literature has failed to give adequate attention to the characteristics of individuals, despite the general trend on the importance of these characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013; Felin, Foss, Heimeriks, & Madsen, 2012). Among the others, a relevant individual characteristic is

the *gender*. Indeed, organizations are not insensible to gender (e.g., Dezsó & Ross, 2012; Dezsó, Ross, & Uribe, 2016), which has proven to be relevant in many aspects of firms' organizational design (Baron et al., 1999; Kanter, 1997; Mukhtar, 2002), while, to date, it has gone under-remarked in studies on the allocation of decision authority. Generally, a principal delegates decision authority to an individual if he believes she is competent (Hayek, 1945) and trustworthy (Jensen & Meckling, 1976). However, if the principal does not have reliable information on the ability of the agent to properly make a specific decision, then the allocation of decision authority may be driven by stereotypes, which indeed help deciding using a limited set of information (Renwick & Tosi, 1978; Tosi & Einbender, 1985). It does follow the importance of gender, which is one of the typical sources of stereotypes. Consequently, the aim of this study is to investigate whether the gender of individuals influences the extent to which they are entitled with decision authority. For the sake of relevance, we focus on the allocation of responsibility over strategic decisions by the Board of Directors (board) to the Chief Executive Officer (CEO)<sup>1</sup> (Useem & Zelleke, 2006; Van Den Berghe & Baelden, 2005). Strategic decisions clearly have a strong impact on firm's performance (Snow & Hambrick, 1980; Zahra, 1996). Therefore, it is extremely interesting to assess whether and under what circumstances the extent to which the board delegates authority to the CEO depends on whether the CEO is a woman or a man and, thus, on gender stereotypes. We argue that the probability that the board delegates authority over a strategic decision to the CEO decreases if the CEO is a woman, unless the female CEO proves to the board her competences and trustworthiness. Accordingly, we expect that CEO's generic managerial knowledge, represented by the possession of an MBA, and decision-specific knowledge, as reflected by the work experience in the corresponding functional area, alleviate the negative effect of the gender stereotypes.

To empirically test our hypotheses, we use a unique dataset we created through two data collection phases. The first one is a survey data collection addressed to a sample of Italian firms' CEOs, which allowed us to obtain data on the allocation of decision authority of 17 strategic decisions and on the firms' general organizational design. We then integrated these data with information gathered from secondary sources on individual characteristics. Results of logit regressions on a sample of 3,198 decision-level observations, corresponding to 188 firms, confirm

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<sup>1</sup> In focusing on the board-CEO relation, we depart from the typical levels of analysis considered by the extant literature on the allocation of decision authority: (i) the firm level or the plant level (e.g., Acemoglu et al., 2007; Aghion, Bloom, & Van Reenen, 2014; Bloom & Sadun, 2012; Bloom, Sadun, & Van Reenen, 2010; Colombo & Delmastro, 2008); (ii) some specific decision or function of the firm (e.g., financial decisions, Graham, Harvey, and Puri, 2015, or the R&D function, Arora, Belenson, and Rios, 2014); and (iii) the headquarter-subsidiaries relation (Sengul & Gimeno, 2013).



our hypotheses. Our findings indicate that boards are less likely to delegate a strategic decision to the CEO when the CEO is a woman. However, when female CEOs hold an MBA, certifying managerial knowledge, and have adequate decision-specific knowledge, as reflected in their work experience, the difference depending on CEO's gender vanishes.

Our paper advances knowledge in several ways. First, it contributes to the literature on the allocation of decision authority in organizations by highlighting the role of gender stereotypes in this realm and by theoretically discussing and empirically documenting how individual knowledge can mitigate the impact of these stereotypes. Moreover, we depart from the typical levels of analysis of this literature adopting a decision-level unit of analysis, which gives the opportunity to understand whether decision-level factors matter. Notably, CEO's decision-specific knowledge affects the relation between gender and delegation, while diverse kinds of decisions are delegated differently by the board. Second, the paper adds to the gender literature by showing the importance of this individual characteristic in the allocation of decision authority. To date, the gender literature has disregarded this prominent aspect of firm's organizational design, focusing on how female representation in management affects firm's performance (e.g., Deszo & Ross, 2012; Dwyer, Richard, & Chadwick, 2003; Krishnan & Park, 2005; Perryman et al., 2016), M&As' (e.g., Parola, Ellis, & Golden, 2015) and IPOs' performance (Quintana-García & Benavides-Velasco, 2016), firm's risk taking (e.g., Baixauli-Soler, Belda-Ruiz, & Sanchez-Marin, 2015; Bao et al., 2014; Perryman et al., 2016), and executives' compensation (Perryman et al., 2016). Third, it contributes to the ample debate on firms' Board of Directors by heeding the call of Van Den Berghe and Baelden (2005) for more work on how the characteristics of the firm's management influence the board's delegation policy.

The paper is organized as follows. First, we illustrate our theoretical background and the hypotheses of our study. Second, we introduce the sample and the methodology we used to test hypotheses. Then, we present the results and illustrate robustness checks. Finally, in the discussion and conclusion, we summarize the key findings of the paper, we describe our contribution to the literature and the limitations of the study, also providing some directions for future research, and we present some managerial implications.

## THEORETICAL BACKGROUND AND HYPOTHESES

As the board represents the ownership of the firm (Fama & Jensen, 1983), it has to ensure that management's decisions are in the best interest of firm's shareholders (Boyd, 1994). Consequently, the board monitors firm's top management and advises it in its decision-making activity (Bianco et al., 2015). From this perspective, a fundamental task of the board consists in determining the level of decision autonomy to be granted to the CEO in the different domains of activity, i.e., the allocation of decision authority over different strategic decisions.

Following Dessein (2002), we argue that the board will delegate authority over a given strategic decision to the CEO when the benefits arising from avoiding *loss of information* problems exceed the costs generated by *loss of control* problems. Generally, the CEO possesses more information and knowledge than the board due to the greater firm-specific knowledge, as the CEO directly experiences the functioning of the firm and interacts with the different functions and top managers. Consequently, if the board centralizes authority over a strategic decision, it has to communicate with the CEO in order to acquire the relevant information needed to make that decision. However, the board may lose (crucial) information in case of noisy or opportunistic communications. Delegating decision authority to the CEO avoids these costs and allows to make a more informed decision. Nevertheless, by delegating to the CEO decision authority over a strategic decision, the board loses control over that decision (Aghion & Tirole, 1997). If the CEO has personal objectives, which are not aligned with those of the firm (Jensen & Meckling, 1976; Lubatkin, Ling, & Schulze, 2007), she may make a decision that is not in the interest of the firm (Aghion & Holden, 2011). Consequently, loss of control problems may induce the board to centralize the decision authority.

Basing on this reasoning, the probability that the board delegates a strategic decision to the CEO depends on board's appreciation of the competence and trustworthiness of the CEO. We claim that this appreciation may be influenced by board's stereotypes. Stereotypes allow to make decisions using a limited set of information (Renwick & Tosi, 1978; Tosi & Einbender, 1985). This means that, if the board does not possess reliable information on CEO's trustworthiness and competence in the decision domain and her/his ability in making the strategic decision, stereotypes prevail, driving the board in deciding on the allocation of decision authority. In the following, we claim that gender stereotypes render boards less inclined to allocate authority over a strategic decision to female CEOs.

Stereotypes are generally defined as *“social judgments of individual group members that lead people to judge group members consistently, and in an exaggerated way, with group expectations”* (Lee & James, 2007, p. 229). Specifically, both men and women frame themselves and others through gender stereotypes (Mensi-Klarbach, 2014), which provide expectations on how men and women are and should be (Eagly & Karau, 2002). In a firm context, boards and Top Management Teams (TMTs) are typically dominated by male directors and managers (Deszo, Ross, & Uribe, 2016; Deszo & Ross, 2012; Singh, Vinnicombe, & Johnson, 2001; Singh & Vinnicombe, 2004) and thus gender stereotypes are likely to arise towards female CEOs. Basing on this, we argue that gender stereotypes likely influence the expectations of boards toward female CEOs, and thus their perception of loss of information and loss of control problems in deciding on the allocation of decision authority to CEOs. This effect is reinforced by boards’ awareness of TMTs’ gender stereotypes toward female CEOs.

It is well known that people usually perceive women as less competent and knowledgeable than men (De Pater et al., 2010; Northouse, 2003; Oakley, 2000; Yang & Aldrich, 2014) and, in case it is not clear whether a woman is competent or not, she is likely to be considered as incompetent (Heilman, 2001). Consequently, a female CEO may suffer from this stereotype by the board, which is thus likely to centralize decision authority. As aforementioned, this direct effect is enhanced by the indirect effect of the TMT. Being a male dominated entity itself, the TMT is likely to perceive the female CEO as incompetent and not to follow her decisions when she is granted authority. This, in turn, likely reinforces board’s negative perception towards the female CEO, enhancing the gender stereotype’s effect. Adding to this, the negative gender stereotype on women’s incompetence may also be reinforced by the modesty that typically characterizes them (Budworth & Mann, 2010), who, contrary to men, do not self-promote their successes, but usually underrepresent them and their competences to other people (Berg, Stephan, & Dodson, 1981). We can thus conclude that, in case the CEO is a woman, the board is likely to perceive the loss of information problems arising from centralization of authority over a strategic decision as less severe.

At the same time, gender stereotypes may also influence board’s perception of loss of control problems. Indeed, there is a general conviction that women are likely to champion other goals than maximizing shareholders’ value (e.g., people wellbeing, working with people, helping others, Daymont & Andrisani, 1984) and are perceived as more unpredictable compared to men (Brescoll, 2016; Still, 1994). Therefore, the board is likely to fear that the decision made by a female CEO

diverges from the planned course of action, as she is perceived to pursue personal and divergent objectives. Adding to this, women usually encounter more difficulties in enforcing their orders compared to men, because they are considered as a minority group (Hacker, 1951) and/or they typically adopt a non-authoritarian, less aggressive and assertive linguistic style (Oakley, 2000; Tannen, 1994a, 1994b). If the top managers working with a female CEO perceive this lack of authority and self-confidence, it may be more difficult for the female CEO to get them follow her orders and decisions. As a consequence, when a female CEO is granted authority over a strategic decision, even if she does not intend to behave opportunistically, TMT managers may try to influence her decision making or even overrule her decisions. Hence, with a female CEO, there is more room for divergence from the planned course of action or for the selection of “locally optimal” decisions (i.e., decisions that are optimal for the top manager that successfully acted his influence on the female CEO). Consequently, in case the CEO is a woman and the authority over a strategic decision is delegated to her, the board is likely to perceive loss of control problems as more severe.

In sum, we posit that with a female CEO the board will perceive the loss of information problems generated by centralization of decision authority as less severe than with a male CEO, and the loss of control problems associated with delegating decision authority to the CEO as more severe. Hence, the board will be less likely to delegate decision authority over a strategic decision to a female CEO compared to a male CEO. Hypothesis H1 follows.

*H1. The probability that the board delegates a strategic decision to the CEO is lower if the CEO is a woman.*

Stereotypes are usually considered as automatic and nearly impossible to avoid (Blair, 2002), and this happens also for those related to gender (Elsaid & Elsaid, 2012). As aforementioned, these stereotypes help the board to decide on the allocation of decision authority using a limited set of information and typically lead to consider women as worse than men (from both a loss of information and a loss of control viewpoint). Thus, gender stereotypes drive board’s decision on the allocation of decision authority in case it does not possess reliable information on female CEO’s competence and trustworthiness, and thus on the ability of making proper decisions. Contrarily, following Arvey (1979) and Tosi and Einbender (1985), we argue that this stereotype-based negative evaluation of women disappears when the board possesses reliable information about the female CEO’s ability to make a “good” decision if she is entitled with decision authority. Specifically, we contend that if the female CEO manages to prove to the board that she possesses

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relevant knowledge, gender stereotypes will be less influential in the choice made by the board on the allocation of authority over a strategic decision. As a consequence, the negative effect on delegation of decision authority associated with the presence of a female CEO will be mitigated. In our study, we focus on two types of knowledge: (i) *CEO's generic managerial knowledge*, as reflected in her educational achievement (i.e., whether the CEO holds an MBA), and (ii) *CEO's decision-specific knowledge*, reflected in CEO's work experience in the functional domain corresponding to a focal strategic decision.

A first, general indication of competence that CEOs may send to the board relates to their educational achievement. We posit that having an MBA degree certifies CEO's generic managerial knowledge. If female CEOs hold an MBA degree, boards are likely to perceive them as competent as their male peers. In fact, previous studies indicate that CEOs with an MBA possess greater strategic decision making skills and greater ability to fruitfully recognize and implement opportunities (Lewis et al., 2014). More in general, an MBA helps developing better managerial skills (Yehuda Baruch, 2009) and provides to individuals confidence and self-understanding, a global mindset, creativity, and the ability to be responsive to changes and manage time (Lindorff & Prior Jonson, 2013). Consequently, CEOs with an MBA perform better than other CEOs (Bertrand & Schoar, 2003). Similarly, having an MBA may also positively influence other top managers in the firm, who might be more likely to follow female CEOs' orders and decisions as the MBA might have taught to female CEOs how to effectively interact and communicate with them, adopting a more authoritarian, aggressive, and assertive linguistic style, and thus successfully enforcing their orders. Basing on this and on the knowledge acquired through the MBA, female CEOs are also likely to be able to make globally coordinated decisions. Consequently, we argue that the MBA possessed by female CEOs reduces the negative effect of gender stereotypes on the loss of information problems and the positive one on the loss of control problems, in case of centralization and decentralization respectively (i.e., the perception of the loss of information as less severe and of the loss of control as more severe are likely to decrease). In other words, we contend that possessing generic managerial knowledge helps female CEOs in reducing the negative relation between their gender and the probability that the board delegates the decision authority over a strategic decision, thus being treated as male CEOs.

*H2. If female CEOs hold an MBA, the gender disparity in the decision authority received by the board over a strategic decision is weakened.*

More specifically, if the CEO has previous work experience in a functional domain relevant to a specific strategic decision (e.g., marketing, investments, etc.), the board will be confident that the CEO possesses adequate decision-specific knowledge and would make effective decisions. In other words, the CEO is more likely to be perceived as competent in the relevant decision domain independently of her gender. Indeed, the more an individual has work experience in a specific job (i.e., functional area in our case), the more s/he has accumulated job-related knowledge and skills useful to make decisions in that functional area (Tesluk & Jacobs, 1998). Accordingly, previous studies indicate that more experienced managers make better (i.e., more successful) decisions, as they made similar decisions in the past and they can benefit from the experience gained while making these past decisions (Fredrickson, 1985; Tesluk & Jacobs, 1998). Following this reasoning, we posit that, if the CEO possesses greater functional work experience pertinent to a given strategic decision, the gender stereotype on female CEOs' scarce competences and decision-making skills will have a less negative influence on board's allocation of authority over this specific decision to a female CEO. In this situation, the board will perceive the loss of information problems generated by a female CEO as less severe, and will be relatively more inclined to delegate decision authority to a female CEO than what would occur in absence of this prove of decision-specific knowledge. We then derive hypothesis H3.

*H3. The greater the CEO's work experience in the functional domain pertaining to a focal strategic decision, the weaker the gender disparity in the decision authority given by the board to the CEO.*

## DATA AND METHODS

### Data and sample

To disentangle whether the gender of the CEO plays a role in influencing the probability that the board delegates authority over a strategic decision to her/him, we resort to a unique decision-level database. In building this database we went through the following steps.

First, we retrieved data on the delegation of strategic decisions by the board to the CEO from the *StiMa project* (Rovelli & Rossi-Lamastra, 2016). The *StiMa* project provides information on the organization and functioning of TMTs in a sample of Italian firms. To get these information, a sample of 6,108 CEOs of firms was randomly drawn from the population of Italian firms (50,341 firms) that had 20 or more employees and operated in manufacturing and service industries in 2013. We stratified the sample by size (20 to 49, 50 to 249, 250 to 499, and 500 or more

employees), industry (manufacturing or services), and geographical location (North, Center and South of Italy). Name and personal contact information of firms' CEO were found for a subsample of 3,899 CEOs. Then, we developed a questionnaire that we pilot tested and pre-tested. Starting from February 2014, we sent the final version of this questionnaire by e-mail to the CEOs for whom we had personal contact information. The questionnaire mainly consisted in questions and constructs already validated in the literature, which we first translated into Italian and then, according to established practices (Dillman, 2000; Kriauciunas, Parmigiani, & Rivera-Santos, 2011), back-translated into English to control that the original meaning was preserved. The questionnaire includes 35 questions, 18 of which are perceptible (i.e., Likert-like scales), that served to retrieve data on organizational design (i.e., organizational structure, decision-making process, coordination mechanisms, human resource management, and CEO's time management). Among the others, the questionnaire allowed to get information on the allocation of authority over 17 strategic decisions. Specifically, for each of them, we asked CEOs to indicate whether they are usually made by: 1 = the CEO's corporate superior (i.e., the board of directors); 2 = the CEO; 3 = the first line managers, with formal authorization by the CEO; 4 = the first line managers, autonomously; 5 = the middle managers. Following this scale, decisions for which the CEO indicated a value of 1 are those made by the board, while those associated to a value from 2 to 5 are delegated by the board to the CEO. The 17 strategic decisions are listed in the Table 1 (see the following page), where it is also reported the percentage of firms in which the decision is delegated by the board to the CEO, the same percentage considering female and male CEOs separately, and the p-value of the t-tests indicating differences between them.

At the end of the survey administration, we obtained a sample of 241 firms, with a response rate of 6.18%. Besides generally there are no established rules on the acceptable response rate (Dennis, 2003), the one of the StiMa project is in line with similar studies on CEOs (e.g., the survey addressed to German CEOs by Poterba and Summers (1995) led to a response rate of 4%). Moreover, the response rate suffers from the role of the respondent (Cycyota & Harrison, 2006) as lower response rates usually result from top executives compared to non-executive employees (Baruch, 1999; Baruch & Holtom, 2008; Tomaskovic-Devey, Leiter, & Thompson, 1994). Adding to this, top executives' response rate also decreased in the last decades (D. C. Hambrick, Gelekanycz, & Frederickson, 1993). The sample is representative of the initial target population of firms<sup>2</sup>.

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<sup>2</sup> It is also representative of the contacted sample of 3,899 CEOs.

**Table 1.** List of the 17 strategic decisions and probability of delegation by the board to the CEO

ID	Decision	Delegated to the CEO	Delegated to female CEOs	Delegated to male CEOs	p-value
1	Developing innovative products and services	84.45%	79.17%	85.05%	0.451
2	Introducing significant changes in products and services	90.30%	79.17%	91.55%	0.052
3	Introducing major changes in marketing activities	89.70%	91.67%	89.47%	0.738
4	Entry or exit decisions from markets/product lines	72.65%	52.17%	74.88%	0.020
5	Major price decisions	89.45%	75.00%	91.08%	0.015
6	Radical changes in organizational processes and procedures	89.59%	75.00%	91.12%	0.015
7	Significant changes in the organizational structure	76.99%	62.50%	78.60%	0.075
8	Strategic alliances/partnership with other firms or organizations (acquisitions and joint venture are not included)	59.66%	62.50%	59.35%	0.765
9	Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)	30.93%	30.43%	30.99%	0.957
10	Hiring, firing, promotions, salaries and incentives for the middle management	90.34%	78.26%	91.63%	0.039
11	Labor disputes with unions	95.76%	82.61%	97.18%	0.001
12	(Re)design of management control systems (e.g., planning, budgeting, controlling)	87.39%	83.33%	87.85%	0.527
13	Main financing decisions (e.g., choice of capital providers, relations with the banking system)	71.13%	50.00%	73.49%	0.016
14	Strategic decisions about purchases (e.g., major supplier selection)	92.86%	79.17%	94.39%	0.006
15	Strategic decisions about production insourcing/outsourcing	88.24%	83.33%	88.79%	0.432
16	Expansion of production capability, expansion and modernization of production equipment and plants	72.49%	63.64%	73.43%	0.328
17	Significant investments in information and communication systems	75.95%	45.45%	79.07%	0.000

P-values refer to the t-tests comparing female and male CEOs on the probability of delegation by the board to the CEO.

Indeed, chi-tests showed that there are no statistically significant differences between the distribution of firms by industry ( $\chi^2(1) = 2.058$ ; p-value = 0.151) and geographical location ( $\chi^2(2) = 0.910$ ; p-value = 0.634). However, statistical difference emerged considering the size classes based on the number of employees ( $\chi^2(3) = 659.3848$ ; p-value = 0.000): firms with at least 250 employees are over-represented, while those with 50 or less employees are under-represented probably depending on the high difficulties in finding personal contact information of the CEOs of the smallest firms. Apart from representativeness, we also investigated the possible presence of non-response bias. First, we compared respondents and non-respondents and we did not find differences in the industry and the average number of employees; second, we considered early respondents and late respondents and again no statistical difference in the number of employees and the industry of firms, and in the educational background and the age of CEOs emerged. Lastly, we checked the reliability of answers received by firms' CEOs through a second survey addressed



to the Chief Human Resource Officers of the firms included in the final sample; here, we compared constructs and items evaluated through Likert-like scales using the Average Deviation Index (Burke & Dunlap, 2002; Danneels, 2015) and we found acceptable values for all the constructs and items<sup>3</sup>. Investigating the reliability of CEOs' answer is important as the hypotheses testing may be influenced by the CEOs who filled in the StiMa questionnaire indicating the level of delegation of each of the 17 strategic decisions we provided. Specifically, it could be that male CEOs overestimated the amount of decision authority received by the board, while female CEOs underestimated the same amount due to the modesty that characterizes women (Budworth & Mann, 2010). However, this aspect does not seem to be a concern. Indeed, comparing CEOs' and HRs' responses for each of the 17 strategic decisions using the Average Deviation Index (ADI, Burke and Dunlap, (2002)), the interrater agreement was acceptable (i.e., for each strategic decision it was lower than the threshold of 0.80, Burke and Dunlap (2002))<sup>4</sup>, meaning that the value of the level of delegation provided by male and female CEOs was not influenced by their gender.

Second, we insourced firms' balance sheet data and data on the composition of the board granted by Aida<sup>5</sup> database and we gathered information about the educational background and work experience of CEOs from their biography. For this purpose, we retrieved CEOs' biography from LinkedIn and other internet sources. We also asked CEOs to share their biography with us. We succeeded in collecting biographies in 189 out of 241 CEOs in the StiMa sample. Then, we manually coded these biographies in order to systematize the information contained within them (e.g., whether CEOs hold an MBA, in what firms they worked before the focal one, what roles they covered, in what functional areas they worked).

In the final step, we created the decision-level database we used to test hypotheses. As a start, we transformed the firm-level StiMa database in a decision-level one considering the 17 different strategic decisions that CEOs had to evaluate in the questionnaire. In so doing, we obtained a sample where each observation is specific of the firm (and CEO)  $i$  ( $i = 1$  to 241) and the decision  $j$  ( $j = 1$  to 17). Once created this decision-level database, we added the information gathered from the secondary sources. Specifically, we associated to each firm  $i$  in the StiMa sample the composition of its board and to each CEO  $i$  data on her/his educational background and work

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<sup>3</sup> See Rovelli and Rossi-Lamastra (2016) for further details about the survey data collection and all the checks for data reliability we did.

<sup>4</sup> See Rovelli & Rossi-Lamastra (2016) for further details.

<sup>5</sup> <http://aida.bvdinfo.com>. Aida from Bureau van Dijk (BvD) is a database containing information and balance sheets for all the Italian firms.

experience. Due to missing values referring to the variables used in this study, to the difficulties in finding the biographies of the CEOs, and to fact that not all the firms are involved in all the 17 strategic decisions, the final database we used counts 3,198 observations, which correspond to 188 firms.

## Measures

The dependent variable of our sample is *Delegation<sub>ij</sub>*, a dummy variable equal to 1 in case the decision *j* of the firm *i* is delegated by the board to the CEO. We created this variable taking advantage of the information provided by the StiMa questionnaire. *Delegation<sub>ij</sub>* is equal to 1 in case the respondent CEO indicated that the focal decision is not made at the board level (i.e., it is usually made by the CEO or at a lower managerial level).

Our key independent variable is *Female CEO<sub>i</sub>*. It is a dummy variable that is equal to 1 in case the CEO of the firm *i* is a woman. The other two independent variables, which allegedly influence the relation between *Female CEO<sub>i</sub>* and *Delegation<sub>ij</sub>*, are *CEO's MBA<sub>i</sub>* and *CEO's work experience<sub>ij</sub>*. *CEO's MBA<sub>i</sub>* is a dummy variable equal to 1 in case the CEO of the firm *i* holds an MBA. *CEO's work experience<sub>ij</sub>* measures the number of years (transformed in logarithm) that the CEO of the firm *i* worked in the functional areas (and roles) pertinent to the focal decision *j*. To define this association, we based on the aforementioned list of 17 strategic decisions indicated in the questionnaire (see Table 1) and on a list of 13 functional areas<sup>6</sup> to which we added the roles of CEO and general manager to ensure an association also to the most strategic decisions. Specifically, when creating the questionnaire, two researches independently defined a list of functional areas that are ideally present in firms; the two lists were then combined and discussed directly with CEOs to solve disagreements. Then, we associated to each decision the functional areas (and roles) that are typically involved to make that specific decision, meaning that to make it the knowledge associated with the selected areas is needed. Also in this case the association was both defined by researchers and asked directly to CEOs; then, we compared the two resulting associations and we further discussed disagreements. The final association between strategic decisions and roles is provided in the Appendix.

In line with previous delegation literature (e.g., Acemoglu et al., 2007; Bloom & Sadun, 2012; Colombo & Delmastro, 2008), we included in our models several controls. The first set of control

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<sup>6</sup> In alphabetical order: administration, business development, finance, human resources, information and communication technology, legal, marketing, production, purchasing, research and development, sales, supply chain, sustainability.

variables refers to the characteristics of the firm that might affect the allocation of decision authority by the board to the CEO. Specifically, we controlled for the size of the firm (*Firm's size<sub>i</sub>*), which is measured as the logarithm of the firm's sales in 2013, the rate of growth in the sales (*Firm's growth<sub>i</sub>*) in the last three years (i.e., from 2010 to 2013), and the (logarithm of) firm's age (*Firm's age<sub>i</sub>*). The idea is that the more the firm grows, the more it becomes complex and the more the need of delegation increases; adding to this, board of the biggest and complex firms usually appoint the best CEOs to manage their firms and thus delegation is likely to be higher. Then, we also included three dummy variables referring to the governance of the firm, which indicate whether the firm is a family firm with a family CEO (*Family owned and managed firm<sub>i</sub>*) or with a professionalized CEO (*Family firm with professionalized CEO<sub>i</sub>*), and a *Subsidiary firm<sub>i</sub>*.

The second set of control variables takes into account two characteristics of the board. In particular, we measured the (logarithm of the) average tenure of the directors in the board (*Board's average tenure<sub>i</sub>*) and the percentage of female directors over the total number of directors in the board (*Board's female representation<sub>i</sub>*). Longer tenure boards might have greater knowledge on the firm's functioning and this might negatively affect delegation of strategic decisions in general; differently, board with a higher female representation might be less subject to gender stereotypes and thus delegate more to female CEO compared to male dominated boards.

Lastly, we included in our model control variables representing other characteristics of the CEO that might influence the board in delegating decision authority. The first two variables measure the age of the CEO (*CEO's age<sub>i</sub>*) and *CEO's tenure<sub>i</sub>*, computed as the number of years since the CEO has been working in the focal firm *i*. Other three control variables are: *CEO's duality<sub>i</sub>* (a dummy variable equal to 1 in case the CEO is also chairman of the firm's board of directors), *CEO internally promoted<sub>i</sub>* (a dummy equal to 1 in case the CEO was internally promoted), and *CEO not appointed by the board<sub>i</sub>* (a dummy variable equal to 1 in case the tenure of the CEO is longer than the board's maximum tenure, meaning that the CEO was not appointed by directors in the current board). It is reasonable to think that the board might be more likely to delegate decision authority to the CEO if s/he is part of the board (as s/he may influence other directors) or if s/he was internally promoted or appointed by the current board (due to higher trust and knowledge towards her/him). Lastly, we included the level of diversity of the work experience of the CEO (*CEO's functional diversity<sub>i</sub>*), meaning how her/his functional experience is specialized (i.e., experience in only one or few functional areas) or general (i.e., experience in several diverse functional areas).

To measure it, we considered the 13 functional areas we used to measure *CEO's work experience<sub>ij</sub>* and then, following Musteen, Barker, and Baeten (2006), we used the Blau's (1977) index of heterogeneity,  $1 - \sum(P_i)^2$ , where  $P_i$  is the percentage of years the CEO worked in the functional area  $i$ .

## Method

Due to the binary nature of our dependent variable, we tested our hypotheses using logit regressions. In these models, we included the aforementioned variables and a series of dummy variables capturing the fixed effects associated with the industry and the geographical location of the firm and the specific strategic decision taken into account. In details, *Industry dummies<sub>i</sub>* referred to the Pavitt-Miozzo-Soete classification (Miozzo & Soete, 1989; Pavitt, 1984): four dummies for the manufacturing industry (i.e., science based, supplier dominated, scale intensive, and specialized suppliers), four for the service industry (i.e., knowledge intensive business services, supplier dominated services, physical networks services, and information networks services), while residual to these there is a dummy related to the construction industry. About the *Geographical dummies<sub>i</sub>*, we included two dummies representing two of the three main Italian geographical areas, North and Center, while the South of Italy is the baseline. Lastly, *Decision dummies<sub>j</sub>* were included to take into account the 17 different strategic decisions represented in the database and that may be delegated differently by the board<sup>7</sup>. Indeed, for most decisions (see Table 1) we observe that the percentage of cases in which the board delegates decision authority to the CEO is generally above 80 percent. Thus, the board typically leaves responsibility to the CEO. Strategic decisions involving large investments (e.g., joint ventures, acquisitions, and opening of new plants) are the main exceptions as they are centralized in the board in around the 70% of the sample firms. In line with our expectations, the percentage of delegation of these strategic decisions is generally lower when the CEO is a woman. This is true especially for decisions related to changes in organizational structure, processes, procedures and products, human resource management, strategic purchasing, and ICT.

To test our hypotheses, we standardized all the continuous variables, we clustered errors around firms, and we run three models: the first one includes only control variables, the second one adds the direct effect of *Female CEO<sub>i</sub>*, *CEO's MBA<sub>i</sub>*, and *CEO's work experience<sub>ij</sub>*, while the last model comprises the two interaction terms. To interpret the effect of our independent variables

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<sup>7</sup> The first of the 17 strategic decisions was not included in the model and used as baseline.

and interactions on the probability of delegation by the board to the CEO, we applied two methods (Hoetker, 2007; Zelner, 2009). First, we computed the Average Marginal Effect (AME) of *Female CEO<sub>i</sub>* with all the other variables set at their means through the Delta method (Hoetker, 2007). To interpret interactions' effects, we also calculated the AME of *Female CEO<sub>i</sub>* with *CEO's MBA<sub>i</sub>* set at 0 and 1 (one at the time) and *CEO's work experience<sub>ij</sub>* set alternatively at a low (tenth percentile) and a high (ninetieth percentile) level. Second, following Zelner (2009), we did the same calculations adopting the approach based on simulations proposed by King, Tomz, and Wittenberg (2000). This approach offers a quick check for the results obtained with the Delta method, without relying on the assumptions needed for the latter (Zelner, 2009).

## RESULTS

In Table 2 and 3 we present the descriptive statistics and the correlation matrix of the variables included in this study. In the sample that we used to test hypotheses, the 80.39% of the strategic decisions are delegated by the board to the CEO and the 8.51% of the CEOs is a woman. This percentage is fully in line with previous theoretical and empirical studies, which analyzed the presence of female executives and CEOs in firms and found that they are underrepresented among top management positions (Brady, Isaacs, Reeves, Burroway, & Reynolds, 2011; Dezsó et al., 2016; Mohan, 2014). The correlation between *Delegation<sub>i</sub>* and *Female CEO<sub>i</sub>* is negative ( $\rho = -0.052$ ) and significant ( $p\text{-value} = 0.003$ ), suggesting that female CEOs are associated with a lower probability of receiving decision authority over a strategic decision by the board. About the moderating factors that we considered in this paper, the 23.98% of the CEOs possesses an MBA and this appear weakly negatively correlated with the probability of delegation ( $\rho = -0.031$ ,  $p\text{-value} = 0.083$ ), but it is positively correlated with *Female CEO<sub>i</sub>* ( $\rho = 0.052$ ,  $p\text{-value} = 0.003$ ). Moreover, CEOs have an average of 5.41 years of work experience in the functional areas associated with the strategic decision taken into account; however, *CEO's work experience<sub>ij</sub>* seems to be negatively correlated with *Delegation<sub>i</sub>* ( $\rho = -0.125$ ,  $p\text{-value} = 0.000$ ) and not correlated with the gender of the CEO ( $\rho = 0.008$ ,  $p\text{-value} = 0.656$ ). Concerning the possible presence of multicollinearity, we estimated standard OLS and we computed variance inflation factors (VIF). The highest VIF value is 2.09, while the average VIF is 1.36. We also computed the conditional index and we found a maximum value of 8.73. Both the values are lower than the thresholds (10 and 6 for the maximum and the average VIF, and 30 to 100 for conditional index) generally associated with multicollinearity problems (Belsley, Kuh, & Welsch, 1980).

**Table 2.** Descriptive statistics and correlation matrix (1)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Delegation	0.80	0.40	1.00						
(2) Female CEO	0.09	0.28	-0.05 (0.00)	1.00					
(3) CEO's MBA	0.24	0.43	-0.03 (0.08)	0.05 (0.00)	1.00				
(4) CEO's work experience	5.41	8.49	-0.12 (0.00)	0.01 (0.66)	-0.02 (0.33)	1.00			
(5) Firm's size	189868.80	701767.90	0.01 (0.77)	-0.18 (0.00)	-0.07 (0.00)	-0.03 (0.14)	1.00		
(6) Firm's growth	0.10	0.22	0.09 (0.00)	0.05 (0.01)	-0.02 (0.21)	-0.01 (0.65)	-0.06 (0.00)	1.00	
(7) Firm's age	27.47	19.09	0.01 (0.42)	-0.10 (0.00)	-0.08 (0.00)	-0.01 (0.73)	0.10 (0.00)	-0.29 (0.00)	1.00
(8) Family owned and managed firm	0.31	0.46	0.08 (0.00)	0.12 (0.00)	-0.06 (0.00)	-0.01 (0.69)	-0.29 (0.00)	-0.01 (0.72)	0.19 (0.00)
(9) Family firm with professional CEO	0.16	0.37	0.03 (0.11)	-0.14 (0.00)	0.02 (0.28)	-0.01 (0.52)	0.12 (0.00)	0.08 (0.00)	0.14 (0.00)
(10) Subsidiary firm	0.50	0.50	-0.05 (0.00)	-0.08 (0.00)	-0.01 (0.44)	-0.01 (0.48)	0.39 (0.00)	0.00 (0.87)	-0.10 (0.00)
(11) Board's average tenure	2.42	4.08	0.07 (0.00)	0.01 (0.76)	-0.10 (0.00)	0.02 (0.25)	-0.37 (0.00)	0.10 (0.00)	-0.05 (0.00)
(12) Board's female representation	0.17	0.33	0.02 (0.31)	0.31 (0.00)	0.06 (0.00)	0.00 (0.99)	-0.13 (0.00)	-0.02 (0.25)	0.05 (0.00)
(13) CEO's age	51.09	8.19	-0.03 (0.13)	-0.05 (0.00)	-0.19 (0.00)	0.05 (0.01)	0.22 (0.00)	-0.20 (0.00)	0.16 (0.00)
(14) CEO's tenure	11.98	10.27	0.04 (0.01)	0.11 (0.00)	-0.22 (0.00)	0.10 (0.00)	-0.10 (0.00)	-0.06 (0.00)	0.13 (0.00)
(15) CEO's duality	0.19	0.39	-0.04 (0.01)	0.05 (0.00)	-0.01 (0.48)	0.00 (0.78)	-0.03 (0.1)	0.00 (0.95)	0.00 (0.82)
(16) CEO internally promoted	0.20	0.40	-0.04 (0.05)	-0.01 (0.52)	-0.03 (0.07)	0.01 (0.55)	0.05 (0.01)	-0.10 (0.00)	0.04 (0.03)
(17) CEO not appointed by the board	0.66	0.47	0.04 (0.01)	0.06 (0.00)	-0.12 (0.00)	0.06 (0.00)	0.07 (0.00)	0.01 (0.49)	0.04 (0.02)
(18) CEO's functional diversity	0.02	0.99	0.06 (0.00)	0.01 (0.43)	-0.06 (0.00)	-0.08 (0.00)	-0.05 (0.00)	0.02 (0.2)	0.09 (0.00)

P-values are in parentheses. Means and standard deviations of continuous variables are computed basing on non-standardized values.

**Table 3.** Descriptive statistics and correlation matrix (2)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(8) Family owned and managed CEO	1.00										
(9) Family firm with professional CEO	-0.30 (0.00)	1.00									
(10) Subsidiary firm	-0.38 (0.00)	0.10 (0.00)	1.00								
(11) Board's average tenure	0.27 (0.00)	-0.11 (0.00)	-0.21 (0.00)	1.00							
(12) Board's female representation	0.14 (0.00)	0.05 (0.01)	-0.23 (0.00)	-0.01 (0.68)	1.00						
(13) CEO's age	-0.06 (0.00)	0.02 (0.27)	0.04 (0.04)	-0.20 (0.00)	-0.01 (0.77)	1.00					
(14) CEO's tenure	0.47 (0.00)	-0.16 (0.00)	-0.23 (0.00)	0.12 (0.00)	0.11 (0.00)	0.35 (0.00)	1.00				
(15) CEO's duality	0.03 (0.09)	-0.10 (0.00)	-0.01 (0.45)	-0.09 (0.00)	-0.05 (0.00)	0.13 (0.00)	0.10 (0.00)	1.00			
(16) CEO internally promoted	-0.14 (0.00)	0.03 (0.15)	0.05 (0.00)	-0.12 (0.00)	0.10 (0.00)	-0.06 (0.00)	0.16 (0.00)	0.00 (0.86)	1.00		
(17) CEO not appointed by the board	0.12 (0.00)	0.02 (0.33)	-0.04 (0.01)	-0.35 (0.00)	0.00 (0.83)	0.18 (0.00)	0.34 (0.00)	0.17 (0.00)	-0.03 (0.08)	1.00	
(18) CEO's functional diversity	0.25 (0.00)	-0.20 (0.00)	-0.08 (0.00)	-0.01 (0.7)	0.03 (0.05)	0.23 (0.00)	0.23 (0.00)	0.12 (0.00)	-0.03 (0.06)	0.16 (0.00)	0.29

**Table 4.** Results of the estimations on the probability of delegation by the board to the CEO (logit regressions)

VARIABLES	Model 1	p-value	Model 2	p-value	Model 3	p-value
Female CEO	-		-0.7332 (0.3604)	0.042	-1.2146 (0.3570)	0.001
CEO's MBA	-		-0.0816 (0.2418)	0.736	-0.2261 (0.2417)	0.350
CEO's work experience	-		-0.0432 (0.0909)	0.634	-0.0653 (0.0930)	0.483
Female CEO * CEO's MBA	-		-		1.7592 (0.8860)	0.047
Female CEO * CEO's work experience	-		-		0.3786 (0.2086)	0.070
Firm's size	0.1989 (0.1022)	0.052	0.1634 (0.1016)	0.108	0.1677 (0.1003)	0.095
Firm's growth	0.2088 (0.1214)	0.085	0.2268 (0.1231)	0.066	0.2452 (0.1219)	0.044
Firm's age	0.0514 (0.1143)	0.653	0.0355 (0.1127)	0.752	0.0574 (0.1079)	0.595
Family owned and managed firm	0.5087 (0.3105)	0.101	0.5112 (0.3154)	0.105	0.4891 (0.3131)	0.118
Family firm with professional CEO	0.4447 (0.3131)	0.156	0.3685 (0.3169)	0.245	0.3714 (0.3190)	0.244
Subsidiary firm	-0.1960 (0.2303)	0.395	-0.1691 (0.2283)	0.459	-0.1351 (0.2262)	0.550
Board's average tenure	0.3394 (0.1376)	0.014	0.3178 (0.1331)	0.017	0.3510 (0.1336)	0.009
Board's female representation	0.0279 (0.1129)	0.805	0.0968 (0.1146)	0.398	0.0476 (0.1125)	0.672
CEO's age	-0.1397 (0.1376)	0.310	-0.1554 (0.1336)	0.245	-0.1277 (0.1341)	0.341
CEO's tenure	-0.0005 (0.1687)	0.998	0.0331 (0.1628)	0.839	0.0498 (0.1606)	0.757
CEO's duality	-0.3420 (0.2574)	0.184	-0.3407 (0.2534)	0.179	-0.4298 (0.2562)	0.093
CEO internally promoted	0.0174 (0.2979)	0.953	-0.0072 (0.2994)	0.981	-0.0061 (0.3062)	0.984
CEO not appointed by the board	0.4594 (0.2543)	0.071	0.4580 (0.2608)	0.079	0.4995 (0.2646)	0.059
CEO's functional diversity	0.1756 (0.1198)	0.143	0.1609 (0.1140)	0.158	0.1512 (0.1094)	0.167
Industry dummies	YES		YES		YES	
Geographical dummies	YES		YES		YES	
Decision dummies	YES		YES		YES	
Constant	1.7782 (0.8239)	0.031	1.8949 (0.8146)	0.020	1.9584 (0.7782)	0.012
Observations	3,198		3,198		3,198	
Number of clusters (firms)	188		188		188	
R <sup>2</sup> (Efron)	0.198		0.202		0.210	
ΔR <sup>2</sup>	-		0.004		0.008	
Log likelihood	-1291.060		-1283.244		-1271.941	
DF	40		43		45	
LR(χ <sup>2</sup> )	583.208		598.840		621.445	
ΔLR(χ <sup>2</sup> )	-		15.631		22.605	
Prob>LR(χ <sup>2</sup> )		0.000		0.000		0.000
Prob>ΔLR(χ <sup>2</sup> )		-		0.000		0.000

Robust standard errors in parentheses.

For Model 2, ΔLR(χ<sup>2</sup>) is computed considering it nested on Model 1; for Model 3, it is the corresponding value when the model is nested on Model 2.

**Table 5.** Average marginal effects and first difference of the simulated probability of delegation of decision authority by the board to the CEO based on the models presented in Table 3

	Average Marginal Effect of Female CEO	p-value	First difference Female CEO 0 → 1	p-value
<b>Model 2</b>				
	-0.0919 (0.0449)	0.041	-0.1164 (0.0658)	0.033
<b>Model 3</b>				
CEO's MBA = 0	-0.1770 (0.0631)	0.005	-0.2060 (0.0723)	0.000
CEO's MBA = 1	0.0701 (0.0841)	0.404	0.0409 (0.0850)	0.530
CEO's work experience = 0 years	-0.1674 (0.0456)	0.000	-0.2650 (0.0598)	0.000
CEO's work experience = 18 years	-0.0301 (0.0811)	0.710	-0.0979 (0.1066)	0.385

Robust standard errors in parentheses.

Average Marginal Effects are calculated using the Delta method. The simulation results are based on drawing 1,000 values of probability of delegation of decision authority by the board to the CEO.

We present the results of our estimations in Table 4, while in Table 5 the Average Marginal Effects (AME) of the main explanatory variables are reported to help interpreting results. The first model presented (Model 1) includes only the set of control variables. Considering their Average Marginal Effects, the probability of delegating the authority over a strategic decision by the board to the CEO is higher the more the firm is large and the more it has grown in the last three years. Indeed, an increase of a standard deviation in *Firm's size<sub>i</sub>* leads to a 0.025 percentage points increase in the probability of delegation (p-value = 0.051), while a standard deviation increase in *Firm's growth<sub>i</sub>* increases the probability of delegation by 0.026 percentage points (p-value = 0.085). Moreover, there is also a positive and significant relation with the *Board's average tenure<sub>i</sub>* (an increase of a standard deviation increases the probability of delegation by 0.428 percentage points, p-value = 0.014) and the fact that the CEO was not appointed by the current board (AME of 0.580 percentage points and p-value of 0.071). For what concern the 17 strategic decisions considered in the study, it is worth mentioning that the probability of delegation by the board to the CEO varies in a significant way depending on the type of strategic decision considered. Specifically, the strategic decisions that are typically delegated by the board to the CEO are those concerning the introduction of significant changes in products and services and in marketing activities (including major price decisions), firm's human resources (e.g., hiring, firing, promotions, salaries and incentives for middle managers, and labor disputes with unions), and the strategic purchasing. Differently, the board tends to centralize the authority over strategic decisions about entry or exit from markets and/or product lines, significant changes in the organizational structure,



strategic alliances/partnership, major business investments and financing decisions, expansion of production capability, equipment, and plants, and significant investments in ICT<sup>8</sup>.

The second model (Model 2) considers the direct effects of the three independent variables (*Female CEO<sub>i</sub>*, *CEO's MBA<sub>i</sub>*, and *CEO's work experience<sub>ij</sub>*) and the controls. Focusing on independent variables, as it is shown in Table 5, the Average Marginal Effect of *Female CEO<sub>i</sub>* is significant (p-value = 0.041), negative and of quite high magnitude (-0.092 percentage points). This means that in case the CEO is a woman the probability of receiving decision authority over a strategic decision by the board decreases by 0.092 percentage points; in other words, the probability that a female CEO receives decision authority over a strategic decision is 0.092 percentage points lower than a male colleague. As anticipated, we also computed the AME using the simulation approach (King et al., 2000). Specifically, first we based on the estimation of Model 2 and we defined one value of the coefficient vector from a multivariate normal distribution, which mean is equal to the estimates of the coefficients and the variance matrix is equal to the estimated variance-covariance matrix of the estimates. In a second time, we set all the variables at their mean, with the exception of *Female CEO<sub>i</sub>*. Third, we computed the predicted probability of *Delegation<sub>i</sub>* for the two alternative values of *Female CEO<sub>i</sub>*. Fourth, we calculated the first difference in the predicted probability of delegation of decision authority over a strategic decision by the board when the gender of the CEO changes from male to female. Fifth, to obtain an approximate distribution of the first difference, we repeated these steps for 1,000 times<sup>9</sup>. Looking at the results of this approach shown in Table 5 Model 2, we see that, coherently with the result of the Delta method, the first difference is negative, with a magnitude of -0.116 percentage points, and with a similar level of significance (p-value = 0.033). We can thus conclude that results confirm our H1, which posits that the probability that the board delegates a strategic decision to the CEO is lower in case the CEO is a woman.

In Model 3 we included the moderating effects of two types of CEO's knowledge on the established negative relation between the female gender of the CEO and the probability that the board delegates a strategic decision. First, we considered the moderating effect of the CEO having an MBA, which represents CEO's generic managerial knowledge. As it is possible to see in Table 4, we find a significant moderating effect on average (p-value = 0.070). In specific, looking at Table 5

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<sup>8</sup> For the remaining decisions there is not a statistically significant effect on the probability of delegation of decision authority by the board to the CEO.

<sup>9</sup> To check the robustness of the results of the King et al.'s (2000) method, we repeated the simulation for 5,000 and 10,000 times. In so doing, we obtained similar results. Results are available from the authors upon request.

Model 3, when *CEO's MBA<sub>i</sub>* is equal to 0, the probability of receiving decision authority by the board is 0.177 percentage points lower in case the CEO is a woman (p-value = 0.005). This means that, when considering CEOs who do not hold an MBA, female CEOs are less likely to receive decision authority over a strategic decision compared to male ones. Conversely, when *CEO's MBA<sub>i</sub>* is equal to 1, the Average Marginal Effect of *Female CEO<sub>i</sub>* loses its significance (p-value = 0.404), meaning that there is no difference in the probability of board's delegation when considering CEOs who hold an MBA. Also in this case, results of the simulation approach are fully in line with those obtained with the Delta method. Consequently, our second hypothesis (H2) suggesting that CEO's possession of an MBA offsets the gender disparity in the decision authority received by the board over a strategic decision is confirmed.

The third model (Model 3) in Table 4 also includes the interaction between *Female CEO<sub>i</sub>* and *CEO's work experience<sub>ij</sub>*, representing CEO's decision-specific knowledge. The evolution of the probability of delegation as a function of the CEO's decision-specific knowledge is shown in the following Figure 1 and 2<sup>10</sup>. Figure 1 shows the difference in the probability of board's delegation between female and male CEOs, which is negative and significant until a value of *CEO's work experience<sub>ij</sub>* equal to 2 years. Figure 2 shows how the probability of board's delegation changes with the increase in *CEO's work experience<sub>ij</sub>* for male and female CEOs separately. Specifically, the probability of delegation slightly decreases for male CEOs, while it increases for female CEOs (the difference is significant for values of *CEO's work experience<sub>ij</sub>* lower than 2 years). In details, as shown in Table 5 Model 3, when the CEO does not have work experience in the functional areas associated with the strategic decision taken into account<sup>11</sup> (and all the remaining variables are at their mean value), the Average Marginal Effect of *Female CEO<sub>i</sub>* is negative (-0.167 percentage points) and highly significant (p-value = 0.000). This means that, taken a female CEO who does not possess knowledge specific in the decisional area, the probability that the board delegates decision authority over that decision is lower compared to a male CEO. Contrarily, when the value of *CEO's work experience<sub>ij</sub>* is higher and equal to 18 years<sup>12</sup>, the AME of *Female CEO<sub>i</sub>* is small and not significant (p-value = 0.710). Consequently, when female CEOs possess a high level of knowledge in the functional areas associated with the decision, the negative effects of gender stereotypes are overcome and there is no more statistical difference between female and male

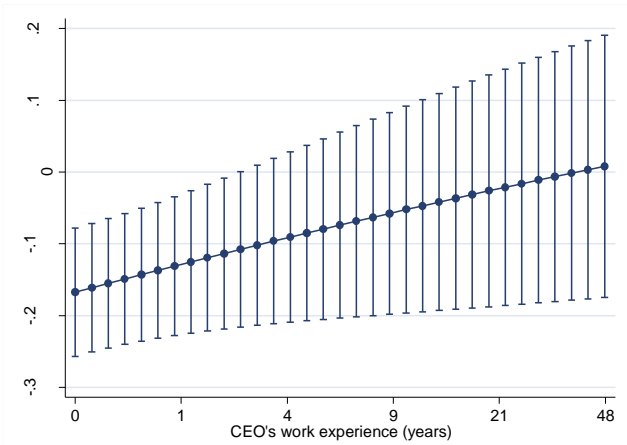
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<sup>10</sup> The same results are found following Zelner (2009) and using the simulation approach of King et al. (2000); results are available from the authors upon request.

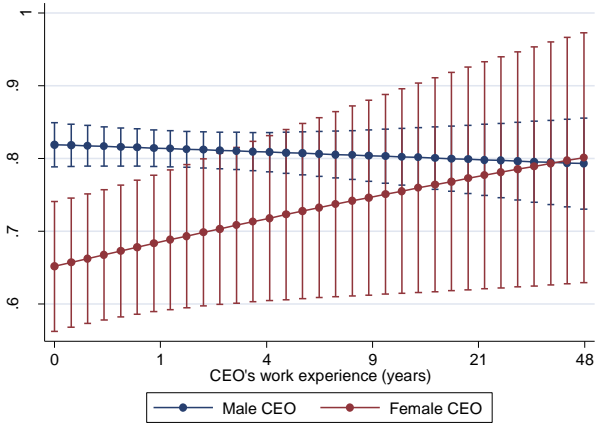
<sup>11</sup> The 10<sup>th</sup> percentile of *CEO's work experience<sub>ij</sub>* corresponds to a value of 0 years.

<sup>12</sup> This is the value corresponding to the 90<sup>th</sup> percentile of *CEO's work experience<sub>ij</sub>*.

CEOs in the probability of delegation by the board. Also in this case we applied the simulation approach to find a confirmation for these results. Specifically, we calculated the first difference following the same steps described above, but repeating the calculation for the two alternative values of *CEO's work experience<sub>ij</sub>* (i.e., tenth and nineteenth percentile). The simulation approach led to the same results of the Delta method. Consequently, results confirm that the increase in the CEO's decision-specific knowledge decreases the gender disparity in the decision authority received by the board over a strategic decision and this disparity disappears starting from a value of CEO's decision-specific knowledge equal to 2 years of work experience (H3).



**Figure 1.** Average marginal effect of Female CEO as a function of CEO's work experience (95% confidence interval)



**Figure 2.** Predicted probability of delegation of decision authority as a function of CEO's gender and CEO's work experience (95% confidence interval)

**Robustness checks**

The results presented above may have been influenced by some choices we made in selecting the sample of CEOs to test hypotheses, as well as there may be a possible problem of endogeneity. For these reasons, in this section we present some robustness checks that we did to test the robustness of our findings. Results are available from the authors upon request.

The first robustness check is about one aspect of the governance of the firms in the sample. In particular, the delegation policy towards the CEO of a subsidiary may be different compared to the one used in independent firms (e.g., the CEO of the subsidiary may be only responsible for the implementation of the strategic decisions made by the headquarter). Therefore, we decided to run our estimations dropping subsidiaries from the sample, which constitute the 49.97% of the firms in the sample used for to test hypotheses. Estimations on the restricted sample of 1,600 observations, corresponding to 94 firms, partially confirm previous results. Specifically, the direct negative effect of *Female CEO<sub>i</sub>* is not significant in the model with only direct effects (p-value = 0.198), while the two moderating effect are still confirmed (i.e., gender disparity exists when CEOs do not possess generic managerial and decision-specific knowledge, while female and male CEOs are treated equally when knowledgeable).

To test the robustness of our findings, we also resorted to an instrumental variables (IV) methodology. Indeed, there may be a problem of endogeneity as the choice between a female and a male CEO is not random and it may be that female CEOs are appointed in those firms whose board typically centralize decision authority, without providing to the CEO a wide authority. Thus, a problem of reverse causality may exist and, if it is, estimates would be inconsistent and biased. To take into account this problem, we resorted to an IV approach and, given the peculiarity of our setting (i.e., a logit regression with a binary endogenous regressor), we applied a linear probability model (LPM) with instrumental variables. Linear two stage least squares (2SLS) are usually adopted in this kind of situation as, even if the predicted probability in the first stage can be negative or higher than 1, they provide a good approximation of the treatment effect and real marginal effects (Lewbel, Dong, & Yang, 2012). Moreover, applying 2SLS using directly non-linear models resides in the category of the so-called *forbidden regressions*, as, for instance, using a non-linear model in the first stage would lead to residuals that may be correlated with fitted values and covariates (Angrist & Pischke, 2008). In the first-stage of the IV approach, the board decides whether to appoint a female or a male CEO. Also relying on the literature on the appointment of female CEOs and on the presence of female executives in top management positions (e.g., Cook & Glass, 2015; Elkinawy & Stater, 2011; Gupta & Raman, 2014; Krishnan, 2009), we defined a set of independent variables to use in the first-step and that likely explain the presence of a female CEO in the focal firm. First, we used as an instrumental variable the *Female employment rate<sub>i</sub>* in 2012 in the province where the firm is located (source: Istat). The idea behind this variable is that with the increase in the female employment rate, the number of women in the labor market increases, and

thus the probability that a woman is appointed as CEO increases as well. Consequently, a high rate of female employment in the province of the firm leads to a higher probability of finding a woman as CEO in the focal firm. Differently, we assume that the female employment rate does not influence the extent to which the boards delegate decision authority over a strategic decision to the CEO, independently for her/his gender. This instrument is therefore relevant. Adding to this variable, we considered *Board's female representation<sub>i</sub>*, *CEO's internally promoted<sub>i</sub>*, *CEO in the past<sub>i</sub>*, *CEO's degree<sub>i</sub>* (i.e., a dummy variable indicating whether the CEO possesses a degree or not), *CEO's functional diversity<sub>i</sub>*, *TMT's size<sub>i</sub>* (i.e., the number of managers composing the TMT) and the percentage of *Graduated women<sub>i</sub>* in the region of the focal firm (source: Istat). At the firm level, we included *Firm's size<sub>i</sub>*, *Firm's age<sub>i</sub>*, and whether the firm is a *Family owned and managed firm<sub>i</sub>*, a *Family firm with a professional CEO<sub>i</sub>*, and a *Subsidiary firm<sub>i</sub>*. Lastly, we added to the model *5-years dummies<sub>i</sub>* (i.e., dummies that indicate the 5-years period in which the CEO was appointed in the focal firm<sup>13</sup>), *Industry dummies<sub>i</sub>* and *Geographical dummies<sub>i</sub>*. Considering this set of independent variables, we predicted the probability of appointing a female CEO in the first step using a OLS model and then we included this prediction in the second-step. Also in this case, we treated our dependent variable as continuous and we run a OLS model. Once concluded the IV methodology, we conducted the Durbin-Wu-Hausman endogeneity test (Davidson & MacKinnon, 1993) for *Female CEO<sub>i</sub>*. Specifically, we included the residuals of the first-step IV estimation in Model 2 of the main estimations. In so doing, residuals are positive and significant (p-value = 0.021), thus indicating the presence of endogeneity. However, results are still confirmed after the IV methodology. Indeed, analyzing Average Marginal Effects, we find the same results of the main estimations.

Lastly, we verified the robustness of our results also relying on a Propensity Score Matching (PSM) procedure and testing our hypothesis on a matched sample of female and male CEOs. Specifically, considering the firm-level sample of 188 firms corresponding to the decision-level one used to test hypotheses, we randomized the sample and we used a one-to-four PSM methodology to match each female CEO with four twin male CEOs. For the matching procedure, we obtained the propensity scores through a logit regression. We defined the set of independent variables including variables that explain simultaneously the treatment (i.e., the appointment of a female CEO) and the outcome (i.e., the probability of delegation of decision authority by the board to the

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<sup>13</sup> We created 9 dummies referring to the years 1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2010; each variable is equal to 1 in case the CEO was appointed in that period of time.

CEO) and that are not influenced by the treatment itself (e.g., Caliendo & Kopeinig, 2008; Sianesi, 2004; Smith & Todd, 2005). Thus, we considered *Board's size<sub>i</sub>*, *Boards' average tenure<sub>i</sub>*, *Board's female representation<sub>i</sub>*, *CEO's degree<sub>i</sub>*, *CEOs' functional diversity<sub>i</sub>*, *CEO's authority<sub>i</sub>*<sup>14</sup>, *CEO's in the past<sub>i</sub>*, and *CEO appointed in the last 10 years<sub>i</sub>* (i.e., a dummy variable that is equal to 1 in case the CEO was appointed in the last 10 years). At the firm-level, we added *Firm's size<sub>i</sub>*, *Firm's age<sub>i</sub>*, *Family firm<sub>i</sub>*, *Subsidiary firm<sub>i</sub>*, *Industry dummies<sub>i</sub>* and *Geographical dummies<sub>i</sub>*. The matching procedure passed the balancing and reliability tests suggested by Dehejia & Wahba (2002)<sup>15</sup> and resulted in a sample of 42 CEOs, composed by 12 female CEOs and 30 male ones. Then, using the decision-level matched sample, consisting in 714 observations, we run again our Model 2 and 3. Also in this case, results are fully coherent with our main estimations.

## DISCUSSION AND CONCLUSION

In this paper, we go deeper in the study of the determinants of the allocation of decision authority. Specifically, following the recent growing interest in the role of individual characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013), we focus on the role of the gender of the CEO in influencing the board's delegation of authority over a strategic decision. The results of our empirical analyses indicate that CEO's gender does influence the board. Indeed, female CEOs are less likely to receive decision authority over a strategic decision compared to male CEOs. Therefore, a gender disparity exists in allocating decision authority at this level of analysis. This finding supports our idea that, when the board does not have reliable information on the ability of the CEO to make proper strategic decisions, gender stereotypes affect the board's perception of the loss of information and the loss of control problems that may arise when dealing with the allocation of decision authority. Indeed, gender stereotypes allow to judge and make decisions in presence of a limited set of information (Renwick & Tosi, 1978) and negatively influence the perception of boards (and TMTs), which are typically male dominated entities (Deszo et al., 2016; Deszo & Ross, 2012; Singh et al., 2001; Singh & Vinnicombe, 2004), towards female CEOs. Specifically, there is a general conviction that women (and thus female CEOs) are less

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<sup>14</sup> We measured *CEO's authority<sub>i</sub>* administering to the CEOs in the StiMa sample the Narcissistic Personality Inventory (NPI, Raskin and Terry (1988)), which is the commonly used instrument to measure narcissistic traits (Andreassen et al., 2012b; Bianchi, 2014; O'Reilly et al., 2014; Petrenko et al., 2015). Then, we considered the 8 paired statements that correspond to an authoritarian personality trait, we coded as 1 the authoritarian self-view and as 0 the non-authoritarian self-view, and we computed the mean across this 8 items.

<sup>15</sup> In details, (i) the *t*-tests for the equality of the means for all the independent variables included in the matching procedure before and after the PSM; (ii) the comparison of the pseudo R<sup>2</sup> obtained estimating the logit model on the matched sample and on the sample before the matching; (iii) the comparison of the p-value of the LR test on the joint significance of the independent variables included in the matching procedure before and after the PSM.

competent and knowledgeable than men (De Pater et al., 2010; Northouse, 2003; Yang & Aldrich, 2014), tend to make decisions without consulting other managers (Mukhtar, 2002), pursue other objectives than maximizing shareholders' value (Daymont & Andrisani, 1984), are more unpredictable (Brescoll, 2016; Still, 1994) and encounter difficulties in enforcing their orders, for instance due to the linguistic style that they usually adopt (Oakley, 2000; Tannen, 1994a, 1994b). As a consequence, if the CEO is a woman, gender stereotypes lead the board to perceive the loss of information as less severe (in case of centralization) and the loss of control as more severe (in case of delegation), thus reducing the probability of delegating a strategic decision to the female CEO.

Despite the negative influence of gender stereotypes on the probability of board's delegation that leads female CEOs to receive less decision authority, our paper demonstrates that the knowledge she possesses helps her in overcoming this situation. Indeed, the more the board becomes aware of the CEO's ability to make "good" decisions<sup>16</sup>, the less it relies on gender stereotypes when deciding on the allocation of decision authority, thus reducing their negative influence. In this sense, CEO's generic managerial and decision-specific knowledge are crucial. Holding an MBA (i.e., CEO's generic managerial knowledge) and having at least two years of work experience in the functional areas associated with the strategic decision taken into account (i.e., CEO's decision-specific knowledge) offset the gender disparity in the decision authority received by the board. In fact, when considering CEOs with an MBA or CEOs with more than 2 years of work experience in the decision domain, the difference between female and male CEOs in the probability that the board delegates a strategic decision in that domain disappears (while there is still a statistically significant difference when considering CEOs without generic managerial knowledge or CEOs with lower decision-specific knowledge). The reason behind this result is that possessing these two kinds of knowledge and making the board aware of this increase the board's consciousness on the ability of the CEO to make "good" decisions in the domain taken into consideration. The board thus relies on these information on CEO's knowledge and the negative effect of gender stereotypes on the loss of information and loss of control decreases, as holding an MBA certifies that the CEO has greater strategic decision making (Lewis et al., 2014) and communication skills, while possessing CEO's decision-specific knowledge indicates to the board that the CEO accumulated knowledge specific in the decision s/he has to make in case of

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<sup>16</sup> In case of delegation, the CEO is perceived to be likely to make a "good" decision when the loss of information would be large in case of centralization and the loss of control is limited.

delegation and learned by similar decision s/he made in the past (Fredrickson, 1985; Tesluk & Jacobs, 1998).

Our study contributes to different streams of literature. First of all, we advance the literature on the allocation of decision authority within firms. We do this in several directions: (i) we go deeper in the study of the effect of individual characteristics on the allocation of decision authority, focusing on the specific aspect of gender and gender stereotypes; (ii) we depart from the typical levels of analysis of this literature, looking at the crucial relation between the board and the CEO, and thus at the delegation of strategic decisions; (iii) we study the allocation of decision authority at the decision-level unit of analysis, thus considering the fact that it may vary depending on the type of strategic decision considered and on decision-level factors (e.g., the CEO's decision-specific knowledge affects the negative relation between the gender of the CEO and the board's probability of delegation). Second, we contribute to the gender literature, introducing the study of delegation in relation to gender. Indeed, this literature disregarded this prominent aspect focusing on how female representation in management affects firm's performance (e.g., Deszo & Ross, 2012; Dwyer et al., 2003; Krishnan & Park, 2005; Perryman et al., 2016), M&A's (e.g., Parola, Ellis, & Golden, 2015) and IPOs' performance (Quintana-García & Benavides-Velasco, 2016), firm's risk taking (e.g., Baixauli-Soler et al., 2015; Bao et al., 2014; Perryman et al., 2016), and executives' compensation (Perryman et al., 2016). Lastly, we contribute to the wide debate on the Board of Directors. In the last years, scholars have devoted an intense research effort in the study of the board and its characteristics, but delegation appears to cover only a marginal role. Board's literature spans from the determinants and consequences of board's composition and structure (e.g., Baldenius, Melumad, & Meng, 2014; Bettinelli, 2011) to boards' processes and interactions (e.g., Forbes & Milliken, 1999; Wan & Ong, 2005); for instance, they studied the effect of having outside (e.g., Bettinelli, 2011) or female directors (e.g., Bianco, Ciavarella, & Signoretti, 2015) in the board. In so doing, this literature stream has also disentangled the implications that board's composition and functioning have on the firm (e.g., Bettinelli, 2011; Dalton & Kesner, 2014). In particular, some scholars have focused their attention on the board-CEO relation addressing the direct effect of CEO's power (e.g., Baldenius, Melumad, & Meng, 2014), meaning the influence and bargaining power that the CEO has towards the board (Baldenius et al., 2014), and its moderating effect in the relation between board's composition and firm's performance (Combs et al., 2007). Quite similarly, another research stream has addressed the consequences of CEO's duality, namely the fact the CEO is also the chairman of the



board (e.g., Baldenius et al., 2014; Combs et al., 2007), and its relation with board's characteristics (e.g., Dalton & Kesner, 2014; Horner, 2010). Again, CEO's turnover has been related to the leadership structure of the board (Goyal & Park, 2002) and the board's independence (Laux, 2008). Lastly, other researchers addressed the appointment of a new CEO (e.g., Zajac & Westphal, 1996) and, more frequently, CEO's compensation (Boyd, 1994; Chhaochharia & Grinstein, 2009; Inderst & Mueller, 2005; Laux & Laux, 2009; Mangel & Singh, 1993; Westphal & Zajac, 1995). However, despite the variety of literature on the board-CEO relation, as far as we know, only two contributions analyzed the delegation of decision authority from the board to the CEO. The first one found that boards more focused on the monitoring than on the advisory role tend to delegate more (Baldenius et al., 2014). In a similar vein, the second study highlighted that higher delegation leads to stronger board's monitoring (Van Den Berghe & Baelden, 2005). Nevertheless, both these papers analyzed how the characteristics of the board affect delegation without taking into account the role of CEO's characteristics. Consequently, our paper contributes to this literature, also heeding the call of Van Den Berghe and Baelden (2005) for more work on how the characteristics of the firm's management influence board's delegation policy.

Our study has some limitations that open up for future studies. First, other individual characteristics of the CEO may be relevant in affecting gender stereotypes and thus influencing the relation between female CEOs and the probability that the board delegates a specific strategic decision to the CEO. For instance, cultural aspects or CEO's personality traits and personal experience may be relevant. Second, in analyzing how it is possible to overcome the negative effect of gender stereotypes on the board's probability of delegation, we only considered the individual characteristics of the CEO. Nevertheless, also those of the board's directors may matter, influencing how they perceive gender stereotypes or the CEO in general, regardless of her/his gender. For instance, gender stereotypes may be overcome thanks to the cultural environment in which board's directors have grown up or their level of education as, generally, highly educated individuals usually express fewer stereotypes and prejudice (Sidanius et al., 2006). Consequently, it would be interesting to take into account the educational background of the board's directors and study whether a higher level of education influences the negative relation between female CEOs and the decision authority granted to them by the board. Third, this relation may be also influenced by the existing similarities among the board's directors and the CEO, with the idea that the higher is the similarity, the lower is the perception of gender stereotypes and their influence on the allocation of decision authority. Fourth, it may be relevant to understand how much this

relation between gender and delegation is generalizable. In this sense, it would be interesting, not only to replicate this study in other countries (as our paper bases on Italian firms), but also at a different level of analysis. For instance, it would be useful to test whether the same finding holds true analyzing the relation between the CEO and her/his TMT members. Adding to this, addressing the TMT it would be interesting to study whether, once obtained decision authority by the board, the gender of the CEO influences also her/his disposition to delegate that decision authority to the managers belonging to it.

Finally, we are confident that this paper may also have some practical implications. First, the paper emphasizes the difficulties that women face once reached the top of the hierarchy. Indeed, this work highlights that differences between female and male CEOs still exists. Despite the number of female CEOs increased over the last years, on average they are still in a limited number and possess less decision authority compared to male CEOs. However, our paper provides some indications on how it is possible to get rid of this situation and help female CEOs to play their role at full. In this sense, female CEOs have to develop generic managerial and decision-specific knowledge, thus working on their education and work experience, and make the board conscious of this knowledge. In so doing, the board will be more aware of the ability of the CEO to make “good” decisions and will not rely on gender stereotypes in deciding on the allocation of authority over strategic decisions. Specifically, investing in an MBA (i.e., generic managerial knowledge) is fruitful and helps female CEOs to be treated as their male counterparts. The same happens with decision-specific knowledge and female CEOs should try to diversify their work experience and highlight it in the eyes of the board’s directors. In fact, when deciding whether to delegate a specific strategic decision or not, our data show that possessing these two kinds of knowledge allows female CEOs to be treated by the board in the same way of male counterparts. At the same time, not only female CEOs have to invest in developing their knowledge, but also boards’ directors have to be aware on how gender stereotypes may frame their judgment and decisions. Specifically, boards’ directors have to keep in mind that when relating with a female CEO, conscious and/or unconscious biases depending on gender stereotypes may prevail, influencing their perceptions and driving their choice to delegate strategic decision authority to the CEO. To avoid this situation (and possible drawbacks depending on a non-optimal allocation of decision authority), board’s directors have to remind to pay more attention to the knowledge possessed by the CEO and less to her/his gender.

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## APPENDIX

**Table 6.** Association between decisions and functional areas and roles

ID	Decision	Functional areas and roles <sup>a</sup>
1	Developing innovative products and services	Business development, marketing, production, R&D
2	Introducing significant changes in products and services	Business development, production, R&D
3	Introducing major changes in marketing activities	Marketing, sales
4	Entry or exit decisions from markets/product lines	Business development, marketing, sales
5	Major price decisions	Marketing, sales
6	Radical changes in organizational processes and procedures	Administration, CEO, HR, general manager
7	Significant changes in the organizational structure	Administration, CEO, HR, general manager
8	Strategic alliances/partnership with other firms or organizations (acquisitions and joint venture are not included)	Business development, CEO, general manager, purchasing, supply chain
9	Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)	Business development, CEO, finance, general manager
10	Hiring, firing, promotions, salaries and incentives for the middle management	Administration, HR
11	Labor disputes with unions	Administration, HR, legal
12	(Re)design of management control systems (e.g., planning, budgeting, controlling)	Administration, finance
13	Main financing decisions (e.g., choice of capital providers, relations with the banking system)	Finance
14	Strategic decisions about purchases (e.g., major supplier selection)	Purchasing, supply chain
15	Strategic decisions about production insourcing/outsourcing	CEO, general manager, production, purchasing, supply chain
16	Expansion of production capability, expansion and modernization of production equipment and plants	Production
17	Significant investments in information and communication systems	ICT

<sup>a</sup> Functional areas are in alphabetical order.





ANNEX 2

## Delegation from the CEO to Top Executives: The Role of Decision-Workload and Decision- Specific Knowledge

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### ABSTRACT

Theoretical literature on delegation demonstrated the relevance of the decision authority holder's (DAH's) and decision authority recipient's (DAR's) knowledge. However, there is still a lack of empirical literature, which mainly focused on the DAH. In this paper we aim to contribute to this literature studying how the decision-workload of the DAH, her decision-specific knowledge and the one of the DAR influence the delegation of decision authority by the DAH to the DAR. We also investigate the interplay between the decision-workload and the decision-specific knowledge. In so doing, we focus on the delegation of a strategic decision in the dyadic relation between the CEO and the TMT manager responsible of that decision domain. Logit estimates on a sample of Italian firms partially confirm hypotheses. The CEO is more likely to delegate a strategic decision when her decision-workload increases, while she is less likely when her decision-specific knowledge increases. In addition, the negative effect of CEO's decision-specific knowledge is significant only for low values of decision-workload, while it does not matter when the CEO has too many strategic decisions to deal with. At the same time, TMT manager's decision-specific knowledge matters only when the decision-workload is very high.

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## INTRODUCTION

Management and economic theory and empirical evidence suggest that the excessive centralization of decision authority is one of the reasons that explain the failure of firms to increase their productivity and performance (Colombo & Delmastro, 2008). Moving from this stylized fact, in this paper we go deeper in the study of the determinants of delegation. Delegation is typically considered as one of the elements that contribute in defining the design of an organization (Dobrajska et al., 2015). Generally speaking, it consists in the extent to which the decision authority over a decision is centralized or delegated downward the hierarchy (Philippe Aghion & Tirole, 1997; Hempel et al., 2012; Lin & Germain, 2003). Several scholars dedicated their efforts towards the study of delegation, emphasizing its crucial role in making better strategic decisions (Colombo & Delmastro, 2008; Grant, 1996; Jensen & Meckling, 1976), better managing the decision-making time (Wernerfelt, 2007) and the knowledge and information distributed within the firm (Acemoglu et al., 2007; Dessein, 2002; Wernerfelt, 2007), improving motivation, creativity, initiative and effort of the employees (Benabou & Tirole, 2003; Gagné & Deci, 2005), and empowering them (Hempel et al., 2012), thus leading to higher job satisfaction, organizational commitment and innovative behavior (Chen & Aryee, 2007). Consequently, delegation helps in improving both firm's efficiency (Harris & Raviv, 2005) and performance (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Rajan & Wulf, 2006). It is straightforward the importance of understanding what are the drivers of delegation.

Existing literature highlights that the choice between delegation and centralization depends on the trade-off between the loss of control that resides in delegation and the improvement of decision's quality that can be achieved exploiting individual's specific knowledge (Dobrajska et al., 2015; Hayek, 1945; Jensen & Meckling, 1976). Following, the individual characteristics of the *decision authority holder* (DAH) and the *decision authority recipient* (DAR) play a key role in determining delegation. However, empirical literature investigating this topic appears to be scarce. Specifically, how individual characteristics may influence delegation has been disregarded and the literature on the effect of knowledge characteristics has analyzed only the side of the decision authority holder, without considering the knowledge possessed by the decision authority recipient. Indeed, from an empirical viewpoint, we know that possessing decision-specific knowledge (i.e., knowledge in line with the decision that is to be made) and the intensity of the information processing both influence delegation (Dobrajska et al., 2015). However, Dobrajska et al. (2015) limited their study to the decision authority holder. Despite this, we are aware that the

knowledge and capabilities of the decision authority recipient matter and that decision authority should be delegated in case he has an informational advantage over the decision authority holder (Harris & Raviv, 2005), thus delegating decision authority to whom is more knowledgeable and capable and improving the quality of the decision. Consequently, with our paper we advance the work of Dobravska et al. (2015). First, we (partially) replicate this study at a different level of analysis, thus proving its generalizability. Second, we go further taking into account the decision-specific knowledge possessed by the decision authority holder. Third, we investigate the interplay between the DAH's decision-workload (i.e., the number of strategic decisions on which she has decision authority) and the decision-specific knowledge possessed by the DAH and the DAR. For sake of relevance, we specifically focus on delegation of strategic decisions within firms and on the dyadic relation between the Chief Executive Officer (CEO, who is the DAH) and the Top Management Team (TMT) manager (the DAR) who is responsible for the domain of the specific strategic decision taken into consideration<sup>1</sup>. Therefore, we concentrate our attention to the delegation of a set of strategic decisions, adding relevance to our study. In fact, strategic decisions are the most important within a firm, having a strong impact on its performance (Dess & Davis, 1984; Snow & Hambrick, 1980), and performing a decision-level analysis allows to take into account the differences among strategic decisions, which likely affect the probability of delegation, and to go further the typical levels of analysis adopted by the delegation literature (e.g., the general firm level or the plant level). With a decision-level analysis, we study whether the delegation of a strategic decision by the CEO to the TMT manager in charge of that decision domain depends on the decision-workload of the CEO, her decision-specific knowledge and the one of the TMT manager. Then, we address how the CEO's decision-workload and CEO's and TMT manager's decision-specific knowledge interacts in explaining the delegation of a strategic decision. In so doing, we try to fill the gap left by scholars who mainly focused on the decision authority holder and we provide an empirically test to the theory that sees the knowledge of the recipient as key in determining delegation (Harris & Raviv, 2005). Moreover, we extend delegation knowledge taking into account an atypical level of analysis (i.e., the delegation of strategic decisions at the top of the hierarchy) and we contribute to the debate on the importance of individual characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013; Felin, Foss, Heimeriks, & Madsen, 2012).

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<sup>1</sup> In general, the TMT is indeed responsible for the large and strategic issues facing the firm and thus involved in the strategic decision making (Amason, 1996; Collins & Clark, 2003).

We empirically test our hypotheses on a sample of 902 decision-level observations. The sample includes 109 firms and, for each of them, we gathered data on the delegation of 21 different types of strategic decisions by the CEO to the TMT managers through a survey addressed to a sample of Italian firms' CEOs. In so doing, we were able to control whether the type of decision influences the probability of delegation by the CEO. Later, we integrated these data with information on individual decision-specific knowledge using CEOs' and managers' biographies. Results of logit regressions (partially) confirm our hypotheses showing that the CEO is more likely to delegate a strategic decision to the TMT manager when her decision-workload and the manager's decision-specific knowledge increase, while she delegates less when her decision-specific knowledge increases. Moreover, the positive effect of CEO's decision-specific knowledge is significant only for low values of decision-workload, while it does not matter when the CEO has too many strategic decisions to deal with. At the same time, manager's decision-specific knowledge matters only when CEO's decision-workload is very high.

The reminder of the paper is organized as follows. First, we present our theoretical background and hypotheses. Second, we introduce the sample and the methodology we adopted to collect data and test hypotheses. Third, we illustrate results, including several robustness checks. Lastly, in the discussion and conclusion, we summarize key findings, we describe our contributions and limitations, we provide some directions for future research, and we present some managerial implications.

## THEORY AND HYPOTHESES

Delegation has been at the center of attention of several scholars. The reason resides in its great importance in influencing firms' productivity (Colombo & Delmastro, 2008), efficiency (Harris & Raviv, 2005), and performance (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Rajan & Wulf, 2006). The way in which decision authority is concentrated or moved downward the firm's hierarchy depends on two main factors: the environment, and the individual characteristics of the *decision authority holder*, *DAH* (i.e., the individual who holds the decision authority and may or may not decide to delegate it), and the *decision authority recipient*, *DAR* (i.e., the individual who may or may not receive the decision authority from the decision authority holder).

The majority of the empirical works interested in the determinants of delegation established the key role of the environment, meaning the industry and technology (e.g., Acemoglu et al., 2007; Lin & Germain, 2003), and the geographical location of the firm (e.g., Bloom, Sadun, & Van Reenen,

2009). Specifically, delegation is enhanced by industry competitiveness and production technology routineness, while it is reduced by technological turbulence (Lin & Germain, 2003). At the same time, a higher level of delegation is shown by firms closer to the technological frontier, younger firms and those operating in heterogeneous industries (Acemoglu et al., 2007). Delegation is also influenced by the geographical location of the firm. Following Bloom et al. (2009), being located in countries with a higher level of social capital in term of trust increases the level of delegation of firm's decision-making authority.

However, not only the environment matters in defining the level of delegation, but also the individual characteristics of DAH and DAR. Choosing between delegation and centralization, the DAH faces a trade-off between the need of improving the quality of the decision and avoiding to lose control over the decision in case it is delegated (Dobrajska et al., 2015; Fama & Jensen, 1983). This trade-off is likely influenced by the individual characteristics of both the DAH and DAR, as the workload and the knowledge possessed. Specifically referring to knowledge, those possessed by the DAH and DAR influence the quality of the decision, as the decision authority should reside in the hand of the individual who possesses greater knowledge (Harris & Raviv, 2005). However, to date, the role of knowledge has been assessed only taking into consideration the side of the DAH (Dobrajska et al., 2015).

In the following, we draw our hypotheses. First, we deal with the already established relation between the individual characteristics of the DAH and delegation. In fact, our first aim is to partially replicate the study of Dobrajska et al. (2015), testing whether their findings on workload and knowledge apply also at the CEO-TMT manager level. Second, we argue that also the knowledge possessed by the DAR may matter, as stated by the theoretical literature on delegation (e.g., Harris & Raviv, 2005; Hayek, 1945). In so doing, we focus on a particular type of knowledge, which is the one specific of the decision that the DAH as to decide whether to delegate or centralize (i.e., decision-specific knowledge). Third, we go deeper in the interplay between the decision-workload of the DAH and the decision-specific knowledge possessed by the DAH and the DAR, trying to understand whether their knowledge matter differently at different level of DAH's decision-workload.

### **Delegation based on the individual characteristics of the decision authority holder**

Analyzing the empirical literature on delegation, it emerges that the role of the individual characteristics has only been studied focusing on the DAH, disregarding the DAR. Specifically,

scholars evaluated the effect of the workload (i.e., the number of decision that an individual is responsible for, here called decision-workload) and the knowledge possessed and found that both the decision-workload and the individual knowledge of the DAH affect the probability of delegation (Dobrajska et al., 2015; Graham et al., 2015). Following Dobrajska et al. (2015), the higher is the number of decision under the responsibility of the DAH, the higher is the probability that a decision is delegate by her to the DAR, reducing the risk of information processing overload. Differently, in case there is a match between the knowledge possessed by the DAH and the one needed to make a decision, the probability that that decision is delegated decreases, meaning that she chooses to exploit the knowledge she possesses instead of relying on those of the DAR. While the authors studied delegation within a single firm and considering the projects accomplished across its business units, here, as aforementioned, we aim to test whether these findings hold also at the highest level of the firm and thus considering the delegation of strategic decisions.

Concerning the decision-workload, empirical evidence suggests that the increase in the number of decisions that the DAH is responsible for increases the delegation of decision authority (Dobrajska et al., 2015). In fact, with the increase in the decision-workload, the DAH becomes more time constrained and the high number of decisions she has to handle may results in excessive information processing compared to her cognitive capacity (March & Simon, 1958; Rivkin & Siggelkow, 2003). This, in turn, leads to information overload and lower decision-making effectiveness (Gavetti et al., 2007; Mendelson, 2000; Ocasio, 1997, 2011; Simon, 1982). Indeed, the increase in information overload reduces the speed of the decision making thus reflecting in inefficient and obsolete decisions (Galbraith, 1973; Khandwalla, 1973; Lawrence & Lorsch, 1967; Radner, 1992; Tushman & Nadler, 1978). We argue that this finding holds true also when considering the delegation of a strategic decision by the CEO to the TMT manager who is responsible for that decision domain. Moreover, the effect may be even stronger as CEOs have usually limited management time being time constrained over the number of strategic decisions she has to handle to run the company (Chandler, 1962; Penrose, 1959), which are the most strategic decisions that have to be made within a firm. Consequently, in line with Dobrajska et al. (2015), we posit that with the increase in the decision-workload, the CEO (who is the DAH) is more likely to delegate decision authority to the TMT manager in charge of the corresponding decision domain (DAR).

HYPOTHESIS 1A (H1A). *The increase in the CEO's decision-workload is positively associated with the probability that she delegates a strategic decision to the TMT manager responsible for that decision domain.*

It is well established that information, knowledge and skills matter in the allocation of decision authority (Harris & Raviv, 2005). Making decisions requires specific knowledge and it is even more true for the strategic ones. Therefore, the authority over a decision should be allocated to the most knowledgeable individual, thus co-locating authority and knowledge (Hayek, 1945; Jensen & Meckling, 1992). Only in this way the available knowledge can be used optimally (Hayek, 1945) and the organization can work optimally as well. Consequently, in case the DAH is knowledgeable in the decision domain, she is likely to centralize the decision in order to exploit her knowledge and improve the quality of the decision. Indeed, the more an individual possesses knowledge that is specific of the decision she has to make, the more she is likely to make a successful decision, as she benefits from past decisions in the same decision realm (Fredrickson, 1985; Tesluk & Jacobs, 1998). Conversely, if the DAH does not possess decision-specific knowledge, she is likely to delegate that decision. Indeed, basing on the common assumption of the delegation literature that DAR usually possesses greater knowledge than the DAH (Dessein, 2002), it is likely that the DAR will be more knowledgeable than the DAH. This, in turn, not only helps to improve the decision's quality, but also prevents the loss of information that may take place in case the decision is centralized and the DAR engages in opportunistic and noisy communications when the DAH tries to gather useful information from him (Dessein, 2002). CEOs are thought to delegate less when they are very knowledgeable or well informed (Philippe Aghion & Tirole, 1997) and an empirical tentative to study the tendency to delegate a decision depending on CEO's knowledge has already be done in the literature. Analyzing the relation between the CEO and the Chief Financial Officer (CFO), Graham, Harvey, & Puri (2015) found that delegation of financial decisions by the CEO to the CFO decreases when the CEO is particularly knowledgeable in this decisional area (measured by having a financial background). Studying in a more general framework the delegation of multiple interrelated decisions, Dobrajska et al. (2015) found the same result. In line with these findings, we posit that the DAH's decision-specific knowledge also influences the delegation of decision authority over a strategic decision by the CEO to the TMT manager in charge of that decision domain.



HYPOTHESIS 1B (H1B). *The increase in the CEO's decision-specific knowledge in a strategic decision is negatively associated with the probability that she delegates that strategic decision to the TMT manager responsible for that decision domain.*

### **Delegation based on the individual characteristics of the decision authority recipient**

Despite the importance of knowledge has been theoretically highlighted considering both the DAH and the DAR, empirical studies on delegation investigating the link between individual knowledge and delegation focused only on the characteristics of the DAH (Dobrajska et al., 2015; Graham et al., 2015). Moreover, as aforementioned, theoretical studies on delegation usually assume that the DAR possesses decision-specific knowledge and that this knowledge is greater than the one possessed by the DAH (Dessein, 2002). However, it is not always the case and the DAR may not possess enough knowledge that is specific of the decision he has to make in case it is delegated. We thus argue that the knowledge possessed by the DAR influences the likelihood that the DAH delegates a decision to him. Following the reasoning we used to define H1B, in case the DAR possesses decision-specific knowledge, the DAH is likely to delegate decision authority to him. In so doing, authority is co-located with the knowledge useful to make the delegated decision (Hayek, 1945; Jensen & Meckling, 1992). Thus, it is possible to exploit the knowledge of the DAR, using it efficiently to make better decisions (Hayek, 1945) as the DAR will benefit from past experiences and decisions in that specific decision domain (Fredrickson, 1985; Tesluk & Jacobs, 1998). In addition, delegation reduces the information overload of the DAH. This is even more likely in case the DAH is the CEO of a firm, due to her limited management time and the number of strategic decisions she has to deal with (Chandler, 1962; Penrose, 1959), which likely require specialized knowledge. For the same reasons, delegation is likely to decrease if the DAR does not have knowledge that is specific of the decision. In fact, in this case, delegating a decision to the DAR is likely to lead to low quality decisions and loss of decision authority's control over the delegated decision (Hayek, 1945; Jensen & Meckling, 1992). Lastly, delegating strategic decisions when the corresponding TMT manager is knowledgeable in the decision domain also helps to better manage the time of the DAH and the DAR. Specifically, it allows to conserve the time of more informed managers allowing them to use the one of less able managers for routine or less strategic decisions, while the former deal with more difficult and strategic problems (Garicano & Rossi-Hansberg, 2006). Basing on this reasoning, we posit that also the decision-specific knowledge possessed by the TMT manager responsible for the decision domain (positively) affects the delegation of the corresponding strategic decision by the CEO.

HYPOTHESIS 2 (H2). *The increase in the decision-specific knowledge possessed by the TMT manager responsible for a specific decision domain is positively associated with the probability that the CEO delegates a strategic decision belonging to that decision domain to the TMT manager.*

### **Delegation based on the interplay between decision-workload and decision-specific knowledge**

Despite the decision-workload and the knowledge possessed by the DAH and the DAR may influence DAH's delegation by themselves, we posit that the effect of knowledge may vary depending on how many strategic decisions the DAH has to deal with. As stated above DAH's and DAR's decision-specific knowledge are likely to have, respectively, a negative and a positive effect on the decision of the DAH to delegate a strategic decision to the DAR. Co-locating authority and knowledge (Hayek, 1945; Jensen & Meckling, 1992), both the DAH and the DAR are able to exploit their decision-specific knowledge and use it in an optimal way (Hayek, 1945), in turn improving the quality of the decision.

However, the negative effect of DAH's knowledge may vary depending on the level of decision-workload she has to face. When the number of strategic decisions under the DAH's responsibility is too high, the time constrain becomes so high that the DAH does not have time to make decisions by herself (Dobrajska et al., 2015), even in the case she possesses the knowledge useful to do it. In this situation, the DAH is forced to delegate decision authority, but she may still exploit the decision-specific knowledge she possesses. She may use this knowledge to understand to what DAR allocate decision authority (i.e., choosing to start from the most informed one) and to monitor the DAR once delegated decision authority. Thus, the DAH exploits the knowledge possessed by the DAR to make the decision and exploits her own knowledge to monitor the behavior of the DAR. This, in turn, helps to improve the quality of the decision and to detect a possible opportunistic behavior by the DAR, thus avoiding loss of control (Hayek, 1945; Jensen & Meckling, 1976). In line with this reasoning, we contend that the negative effect of the CEO's (i.e., DAH's) decision-specific knowledge on the probability of delegation of a strategic decision to the TMT manager (i.e., DAR) in charge of the decision domain decreases with the increase in the CEO's decision-workload.

HYPOTHESIS 3A (H3A). *The increase in the CEO's decision-workload weakens the negative association between the CEO's decision-specific knowledge and the delegation of that strategic decision to the responsible TMT manager.*

As aforementioned, also the positive effect of the DAR's decision-specific knowledge may vary with the increase in the DAH's decision-workload. In this case, the idea is that it increases with the decision-workload. As stated in the first hypothesis, the more the DAH's decision-workload, the more she need to delegate a decision authority. While when the decision-workload is low the DAH has the possibility to make decision by herself without giving importance to the knowledge possessed by the DAR, the increase of the decision-workload forces the DAH to pay attention to DAR's decision-specific knowledge in order to delegate properly and assure high quality decisions. Consequently, the relevance of the DAR's decision-specific knowledge increases and its positive effect on delegation increases as well. This allows the DAH to exploit the DAR's knowledge and to avoid communications between them that might lead to loss of information (Dessein, 2002). Coherently with this reasoning, we assert that the positive effect of decision-specific knowledge possessed by the TMT manager (i.e., the DAR) on the probability that the CEO (i.e., the DAH) delegates a strategic decision in the decision domain under the responsibility of the manager increases with the increase in the CEO's decision-workload.

HYPOTHESIS 3B (H3B). *The increase in the CEO's decision-workload strengthens the positive association between the TMT manager's decision-specific knowledge and the delegation of a strategic decision in that decision domain by the CEO to him.*

The following Figure 1 synthetizes our hypotheses.

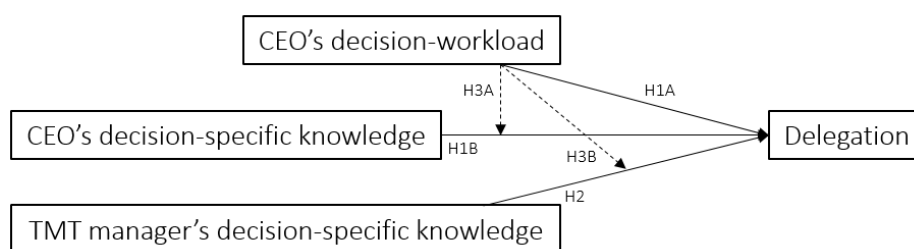


Figure 1. Scheme of the hypotheses

## METHODS AND MEASURES

### Data and Sample

In order to test our hypotheses, we took advantage of a database we created through a survey data collection and the use of secondary sources to gather additional information. First, using a structured questionnaire we created basing also on constructs and questions validated in the

literature<sup>2</sup>, we collected data on the general organizational design of firms and, more specifically, on the delegation of strategic decisions by the CEO to the managers belonging to the TMT, which consists in the key point of the paper. We addressed the survey to the CEOs of a sample of Italian firms. As a start, we retrieved the population of Italian firms (50,341) with more than 20 employees and operating in the manufacturing and services industries from the *Research Department of the Milan Chamber of Commerce*. Then, we randomly extracted a sample of 6,108 firms, stratifying this sample on the number of employees, the industry, and the geographical location. Due to the difficulty in finding the direct contact information of the CEOs of these firms, we succeeded in addressing our structured questionnaire to a restricted sample of 3,899 CEOs (and firms). Once the survey concluded, the usable sample counted 241 firms, corresponding to a response rate of 6.18%. We then checked the representativeness of this sample, the possible presence of non-response biases, and the reliability of CEOs' answers addressing a second survey to their Chief Human Resources Officers. Neither of these three aspects appeared to be a concern<sup>3</sup>. Observing the sample, we notice that the 53.53% of the firms are big, followed by the 34.44% of medium firms and the 12.03% of small firms. The majority of firms are in the North of Italy (65.56%), while the others are equally distributed between the Center and the South. Firms are equally distributed basing on the industry and the governance: manufacturing firms are the 47.30%, while family firms cover the 50.62% of the sample, with the 66.39% of the family firms led by a CEO belonging to the family that owns the firm. On average, the 241 TMTs are composed by 6.36 managers, while the amount of strategic decisions on which the CEO has decision authority (i.e., they are delegated by the Board of Directors (board) to the CEO) is equal to 16.71. Concerning CEOs, the 9.96% of the sample is a woman, they have an average of 51.84 years, while the average tenure as the CEO of the focal firm<sup>4</sup> is equal to 8.35 years.

Once collected data through the survey, we used secondary source to retrieve information on CEOs' and managers' work experiences. Specifically, we properly codified their biographies, which we obtained first asking directly to the CEO and then searching on LinkedIn or on the internet when CEOs were not helpful. Unfortunately, finding biographies was not easy and we succeeded in finding them only for 189 CEOs and 900 managers. We systematized the information contained

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<sup>2</sup> Before sending out the questionnaire, we pilot tested and pretested it.

<sup>3</sup> For a complete and detailed description of the survey and these controls please refer to (Rovelli & Rossi-Lamastra, 2016).

<sup>4</sup> By focal firm we mean the firm in which the individual was covering the role of CEO at the time of the survey.

in these biographies codifying them (e.g., whether they hold an MBA, in what firms and in what functional areas they worked).

Finally, we created a decision-level database that we used later on to test our hypotheses. First, we converted the firm-level database in a decision-level one taking advantage of the 21 strategic decisions included in the questionnaire and evaluated by CEOs, meaning that they provided the hierarchical level in charge of making each decision. The 21 strategic decisions are listed in the following Table 1, where it is also reported the percentage of firms in which the strategic decision is delegated by the CEO to the manager responsible for the corresponding functional area<sup>5</sup>.

**Table 1.** List of 21 strategic decisions

ID	Decision	Delegated by the CEO
1	Developing innovative products and services	60.20%
2	Introducing significant changes in products and services	62.62%
3	Developing sustainable products (environmental-friendly or socially-oriented)	65.79%
4	Introducing major changes in marketing activities	65.07%
5	Entry or exit decisions from markets/product lines	46.47%
6	Major price decisions	57.55%
7	Radical changes in organizational processes and procedures	53.99%
8	Significant changes in the organizational structure	27.17%
9	Strategic alliances / partnership with other firms or organizations (acquisitions and joint venture are not included)	28.87%
10	Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)	31.51%
11	Hiring, firing, promotions, salaries and incentives for the middle management	48.37%
12	Labor disputes with unions	61.95%
13	(Re)design of management control systems (e.g., planning, budgeting, controlling)	61.06%
14	Main financing decisions (e.g., choice of capital providers, relations with the banking system)	54.71%
15	Strategic decisions about purchases (e.g., major supplier selection)	77.83%
16	Strategic decisions about production insourcing/outsourcing	63.33%
17	Expansion of production capability, expansion and modernization of production equipment and plants	46.99%
18	Significant investments in information and communication systems	55.56%
19	Definition of the sustainability strategy for the improvement of the work conditions (e.g., employee empowerment, health and safety programs, training, diversity and equal opportunities management)	65.02%
20	Definition of the sustainability strategy for the development of the civil society (e.g., local community development, anti-corruption practices)	45.83%
21	Definition and implementation of environmental initiatives (e.g., reduction of consumption or recycling of raw materials, energy and water, reduction of emissions and wastes)	67.44%

Doing so, we obtained a sample in which each observation refers to a specific firm  $i$  ( $i = 1$  to 241) and a specific strategic decision  $j$  ( $j = 1$  to 21). Once created this database, we added information on the manager responsible for the corresponding functional area. Specifically, to

<sup>5</sup> In computing these percentages, we considered only the cases in which the CEO has decision authority over the strategic decision; in other words, we did not consider the cases in which the strategic decision is taken by the Board of Directors.

each decision  $j$  and firm  $i$ , we associated the manager of the firm  $i$  that is the Chief Officer of the closest functional area associated with the decision  $j$ . To do so, for each of the 21 strategic decisions, we defined a priority ranking of the functional areas that usually make the decision taken into account in case it is delegated by the CEO, considering the list of 13 functional areas reported in the questionnaire<sup>6</sup>. We defined a ranking of functional areas as they may be not present in all the firms analyzed. In case the functional area ranked as first was present, we associated its Chief Officer to the decision, otherwise we went to the second functional area and so on. The association is provided in the Appendix, Table 6. Then, for each decision  $j$  and firm  $i$  in the decision-level sample, we associated to the corresponding CEO and manager the information about their work experience in the functional areas (and roles) associated with the decision  $j$ . The association is similar to the previous one. We considered the list of 13 functional areas, to which we added also the roles of CEO and general managers, and to each decision we associated the functional areas (and roles) that are typically involved to make that specific decision, meaning that to make it the knowledge associated with the selected areas is needed; this second association is reported in the Appendix, Table 7. Due to decisions made directly by the board, to missing values corresponding to the variables used to test hypotheses, to difficulties in finding CEOs' and managers' biographies, and to the fact that not all the firms make all the 21 strategic decisions, the final database we used consists of 902 observations, corresponding to 109 firms.

## Measures

Our dependent variable is  $Delegation_{ij}$ , a dummy variable equal to 1 in case the decision  $j$  of the firm  $i$  is delegated by the CEO to the corresponding manager. We created this variable basing on one of the questions included in the questionnaire filled in by CEOs. Specifically, we provided to them a list of 21 different strategic decisions (see Table 1) and, for each of them, CEOs had to indicate whether they are usually made by: 1 = the CEO's corporate superior (i.e., the board); 2 = the CEO; 3 = the first line managers, with formal authorization by the CEO; 4 = the first line managers, autonomously; 5 = the middle managers. Observations whose decision has a corresponding value of 1 were excluded from the sample. Then,  $Delegation_{ij}$  assumes the value of 1 in case the CEO indicated that the decision is usually made by the managers below in the

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<sup>6</sup> In alphabetical order: administration, business development, finance, human resources, information and communication technology, legal, marketing, production, purchasing, research and development, sales, supply chain, sustainability.

hierarchy (values from 3 to 5) and 0 in case the decision is usually made by her/himself (value of 2 in the aforementioned scale).

The main independent variables are *CEO's decision-workload<sub>i</sub>*, *CEO's work experience<sub>ij</sub>*, and *Manager's work experience<sub>ij</sub>*. *CEO's decisions-workload<sub>i</sub>* is the number of decisions that are delegated by the board to the CEO over the total number of decisions taken within the firm. In other words, it provides an indication of the breadth of the CEO's decision authority and of the amount of decisions that s/he may decide to make autonomously or to delegate to the corresponding manager. *CEO's work experience<sub>ij</sub>* represents decision-specific knowledge and measures the number of years (transformed in logarithm) that the CEO of the firm *i* worked in the functional areas (and roles) associated with the decision *j* (see above and the Appendix for further details), while *Manager's work experience<sub>ij</sub>* is the same measure but for the manager and considering the work experience he had before being appointed in the TMT of the focal firm.

We then defined a set of control variables that may influence the delegation of a strategic decision by the CEO to the corresponding manager. The first set of control is at the firm-level. Specifically, we had the *Firm's size<sub>i</sub>*, which is measured as the logarithm of the firm's sales in 2013, the *Firm's growth<sub>i</sub>*, computed considering the last three years, and the *Firm's age<sub>i</sub>*, transformed in logarithm too. Indeed, it is a general conviction that the more the firm grows, the more it becomes complex and the more delegation is used within the firm. Then, we controlled for the governance of the firm, considering whether it is a *Family firm<sub>i</sub>*, a *Subsidiary firm<sub>i</sub>*, and a *Joint-stock company<sub>i</sub>*<sup>7</sup>. Lastly, we included the *TMT's size<sub>i</sub>*, whose increase is likely to make the delegation by the CEO to the manager (who is a member of the TMT) more likely. The second set of controls concerns the characteristics of the CEO. Here, we considered *CEO's gender<sub>i</sub>*, a dummy variable equal to 1 in case the CEO is a woman, *CEO's age<sub>i</sub>* and *CEO's tenure<sub>i</sub>* (i.e., the number of years since the individual covered the role of CEO in the focal firm *i*). Then, we had *CEO's authority<sub>i</sub>*, which measures how much the CEO has an authoritarian personality trait and which we expect to be negatively related to delegation. We measured *CEO's authority<sub>i</sub>* administering to CEOs the Narcissistic Personality Inventory (NPI, Raskin and Terry (1988)) questionnaire, the commonly used instrument to measure narcissistic traits (Andreassen, Ursin, Eriksen, & Pallesen, 2012b; Bianchi, 2014; O'Reilly et al., 2014; Petrenko et al., 2015). Considering the 8 paired statements corresponding to an authoritarian personality trait, we coded as 1 the authoritarian self-view and as 0 the non-authoritarian self-view, and we then computed the mean across the 8 items. Last

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<sup>7</sup> Società per azioni (S.p.A.) in Italian.

control variable at the CEO-level is *CEO's MBA<sub>i</sub>*, a dummy equal to 1 in case the CEO holds an MBA. To conclude, the last set of controls deals with the CEO-manager dyad and the similarities between the two. Specifically, we took into account whether the CEO and the manager corresponding to the decision *j* are of the same gender (*Same gender<sub>ij</sub>*), the difference between their ages (*Age difference<sub>ij</sub>*), computed as the age of the CEO minus the one of the manager, and how long they worked together in the TMT (*Together in the TMT<sub>ij</sub>*), computed as the minimum of CEO's and manager's tenure in the TMT.

## Method

To test hypotheses, we used logit regressions depending on the binary nature of our dependent variable *Delegation<sub>ij</sub>*. In these regressions, we included the independent variables mentioned above and a series of dummy variables that take into account the fixed effects related to the industry and the geographical location of the firm and the particular strategic decision considered. Therefore, we included in the models *Industry dummies<sub>i</sub>*, which refer to the Pavitt-Miozzo-Soete classification (Miozzo & Soete, 1989; Pavitt, 1984)<sup>8</sup>, *Geographical dummies<sub>i</sub>*, corresponding to the three main Italian geographical areas (North, Center, and South of Italy), and 21 *Decision dummies<sub>j</sub>*. We included *Decision dummies<sub>j</sub>* because different strategic decisions are represented in the database and they may be delegated differently by the CEO (see Table 1 for the list of strategic decisions). To run all the estimates, we standardized all the continuous variables and we clustered errors around firms. Testing hypotheses, we run three different logit regressions. The first one takes into account only control variables, the second one considers the direct effect of *CEO's decision-workload<sub>i</sub>*, *CEO's work experience<sub>ij</sub>*, and *Manager's work experience<sub>ij</sub>*, while the third one adds the interactions between *CEO's decision-workload<sub>i</sub>* and the two variables measuring the decision-specific knowledge of the CEO and the manager. To understand the effects of the main independent variables and interactions between them on the probability of delegating decision authority by the CEO to the manager, we applied two methods. As a start, we computed the Average Marginal Effects (AME) of *CEO's decision-workload<sub>i</sub>*, *CEO's work experience<sub>ij</sub>*, and *Manager's work experience<sub>ij</sub>* with other variables set at their mean values through the Delta method. Then, to interpret interactions, we calculated the AME of *CEO's work experience<sub>ij</sub>* and *Manager's work experience<sub>ij</sub>* with *CEO's decision-workload<sub>i</sub>* set alternatively at a low (tenth

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<sup>8</sup> We had four dummies for the manufacturing industry (Total Science Based, Total Supplier Dominated, Total Scale Intensive, and Total Specialized Suppliers), four for the service industry (Total Knowledge Intensive Business Services, Total Supplier Dominated Services, Total Physical Networks Services, and Total Information Networks Services), while residual to these is a dummy related to the construction industry.



percentile) and a high (ninetieth percentile) level. Second, we followed (Zelner, 2009) and we did the same calculations implementing the approach based on simulations suggested by King, Tomz and Wittenberg (2000). The positive aspect of this approach is that it offers a quick check for the results of the Delta method, without relying on its assumptions (Zelner, 2009).

## RESULTS

### Summary statistics

As aforementioned, the sample we used to test hypotheses comprised 902 decision-level observations and 109 Italian firms. The following Table 2 and 3 provide a description of the sample basing on the variables included in the study. Concerning the main dimensions under-investigation, on average CEOs have a decision-workload of 87.39%, which corresponds to 18.69 strategic decisions delegated by the board to the CEO. The 60.64% of these strategic decisions is delegated by the CEO to the manager in charge of the corresponding functional area. *Delegation<sub>ij</sub>* and *CEO's decision-workload<sub>ij</sub>* are positively and significantly correlated ( $\rho = 0.266$ ,  $p\text{-value} = 0.000$ ), meaning that the more the CEO's decision-workload increases, the more the CEO tends to delegate a strategic decision downward the hierarchy. About the decision-specific knowledge of CEOs and managers, on average managers possess more knowledge compared to CEOs, with an average of 5.60 years of work experience for managers against 4.30 years for CEOs. Reasonably, *CEO's work experience<sub>ij</sub>* is negatively and significantly correlated with *Delegation<sub>ij</sub>* ( $\rho = -0.134$ ,  $p\text{-value} = 0.000$ ), while the correlation of *Manager's work experience<sub>ij</sub>* with *Delegation<sub>ij</sub>* appears positive but not significant ( $\rho = 0.037$ ,  $p\text{-value} = 0.266$ ), giving a first hint that it is the knowledge of the CEO and not the one of the managers that matters in the allocation of decision authority of a strategic decision by the CEO to the manager. Moreover, *CEO's work experience<sub>ij</sub>* is also positively and significantly correlated with *CEO's decision-workload<sub>ij</sub>* ( $\rho = 0.095$ ,  $p\text{-value} = 0.004$ ), indicating that the busiest CEOs are those with greater decision-specific knowledge.

Regarding the possible presence of multicollinearity, we computed variance inflation factors (VIF) after estimating a standard OLS regression. The highest VIF is equal to 2.34, while the mean is 1.49. We also calculated the conditional index, whose maximum value is 7.40. Both VIF and conditional index are lower than the thresholds (10 and 6 for the maximum and the average VIF, and 30 to 100 for conditional index) associated with multicollinearity problems (Belsley et al., 1980).

**Table 2.** Descriptive statistics and correlation matrix (1)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Delegation	0.61	0.49	1.00						
(2) CEO's decision-workload	0.87	0.14	0.27 (0.00)	1.00					
(3) CEO's work experience	4.30	7.50	-0.13 (0.00)	0.10 (0.00)	1.00				
(4) Manager's work experience	5.60	7.00	0.04 (0.27)	0.00 (0.98)	0.06 (0.05)	1.00			
(5) Firm's size	323673.30	969026.30	0.09 (0.00)	-0.02 (0.50)	0.03 (0.39)	0.05 (0.15)	1.00		
(6) Firm's age	27.68	19.76	0.00 (0.98)	-0.07 (0.05)	0.04 (0.27)	0.03 (0.40)	0.21 (0.00)	1.00	
(7) Family firm	0.39	0.49	0.06 (0.09)	0.20 (0.00)	0.01 (0.67)	-0.10 (0.00)	-0.07 (0.04)	0.33 (0.00)	1.00
(8) Subsidiary firm	0.56	0.50	0.06 (0.07)	-0.09 (0.01)	0.06 (0.05)	0.05 (0.14)	0.36 (0.00)	-0.20 (0.00)	-0.25 (0.00)
(9) Firms' growth	0.13	0.24	-0.04 (0.20)	0.25 (0.00)	-0.01 (0.74)	-0.14 (0.00)	-0.11 (0.00)	-0.34 (0.00)	-0.01 (0.75)
(10) TMT's size	6.97	2.44	0.11 (0.00)	0.10 (0.00)	0.03 (0.30)	0.04 (0.22)	0.34 (0.00)	0.11 (0.00)	0.08 (0.02)
(11) CEO's gender	0.05	0.22	0.01 (0.88)	-0.17 (0.00)	-0.03 (0.42)	-0.01 (0.84)	-0.16 (0.00)	-0.18 (0.00)	-0.09 (0.01)
(12) CEO's age	50.97	7.90	0.06 (0.07)	0.04 (0.19)	0.02 (0.51)	0.01 (0.72)	0.30 (0.00)	0.19 (0.00)	-0.04 (0.29)
(13) CEO's tenure	6.55	8.12	0.09 (0.01)	0.17 (0.00)	0.02 (0.63)	-0.04 (0.24)	-0.20 (0.00)	0.06 (0.09)	0.17 (0.00)
(14) CEO's authority	0.69	0.24	-0.08 (0.02)	-0.02 (0.45)	0.05 (0.17)	0.07 (0.03)	0.05 (0.12)	-0.05 (0.11)	-0.34 (0.00)
(15) CEO's MBA	0.18	0.39	-0.03 (0.34)	-0.10 (0.00)	0.02 (0.57)	-0.04 (0.29)	-0.03 (0.34)	-0.02 (0.65)	-0.07 (0.02)
(16) Same gender	0.78	0.41	0.02 (0.52)	0.07 (0.03)	0.04 (0.29)	-0.05 (0.11)	0.06 (0.08)	-0.04 (0.19)	-0.01 (0.79)
(17) Age difference	3.71	10.14	0.01 (0.69)	-0.13 (0.00)	0.05 (0.17)	0.01 (0.66)	0.13 (0.00)	0.11 (0.00)	-0.02 (0.49)
(18) Together in the TMT	2.71	4.35	0.05 (0.11)	0.12 (0.00)	0.00 (0.92)	-0.16 (0.00)	-0.32 (0.00)	-0.09 (0.01)	0.17 (0.00)

P-values in parentheses. Mean and standard deviations of continuous variables are computed basing on non-standardized variables.

**Table 3.** Descriptive statistics and correlation matrix (2)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(8) Subsidiary firm	1.00										
(9) Firms' growth	0.00 (0.94)	1.00									
(10) TMT's size	0.12 (0.00)	-0.11 (0.00)	1.00								
(11) CEO's gender	-0.03 (0.45)	0.14 (0.00)	-0.16 (0.00)	1.00							
(12) CEO's age	0.07 (0.04)	-0.27 (0.00)	0.08 (0.02)	-0.17 (0.00)	1.00						
(13) CEO's tenure	-0.25 (0.00)	0.05 (0.17)	-0.18 (0.00)	-0.08 (0.01)	0.23 (0.00)	1.00					
(14) CEO's authority	0.14 (0.00)	0.17 (0.00)	-0.02 (0.48)	-0.05 (0.15)	-0.16 (0.00)	0.04 (0.19)	1.00				
(15) CEO's MBA	-0.15 (0.00)	0.01 (0.86)	0.03 (0.30)	-0.02 (0.55)	-0.17 (0.00)	-0.16 (0.00)	0.16 (0.00)	1.00			
(16) Same gender	0.04 (0.28)	0.06 (0.08)	-0.08 (0.02)	-0.14 (0.00)	0.09 (0.01)	-0.05 (0.15)	-0.02 (0.61)	0.09 (0.01)	1.00		
(17) Age difference	0.08 (0.02)	-0.20 (0.00)	0.00 (0.98)	0.00 (0.93)	0.65 (0.00)	0.18 (0.00)	-0.10 (0.00)	-0.09 (0.01)	-0.02 (0.49)	1.00	
(18) Together in the TMT	-0.12 (0.00)	0.11 (0.00)	-0.09 (0.01)	-0.09 (0.01)	-0.03 (0.37)	0.60 (0.00)	-0.05 (0.17)	-0.12 (0.00)	-0.06 (0.09)	-0.10 (0.00)	1.00

## Hypothesis testing

**Table 4.** Results of the estimations on the probability of delegation of decision authority by the CEO to the manager (logit regressions)

VARIABLES	Model 1	p-value	Model 2	p-value	Model 3	p-value
CEO's decision-workload	-		1.0799 (0.1841)	0.000	1.1372 (0.1882)	0.000
CEO's work experience	-		-0.2084 (0.1186)	0.079	-0.2411 (0.1227)	0.050
Manager's work experience	-		0.0762 (0.1031)	0.460	0.0477 (0.1035)	0.645
CEO's work experience * CEO's decision-workload	-		-		0.1658 (0.1300)	0.202
Manager's work experience * CEO's decision-workload	-		-		0.2539 (0.1339)	0.058
Firm's size	0.1906 (0.1701)	0.262	0.2554 (0.1445)	0.077	0.2326 (0.1410)	0.099
Firm's age	-0.1408 (0.1201)	0.241	-0.0387 (0.1159)	0.739	-0.0255 (0.1227)	0.835
Family firm	0.2873 (0.3070)	0.350	-0.0093 (0.3169)	0.977	-0.0067 (0.3264)	0.984
Subsidiary firm	0.3742 (0.3659)	0.306	0.5311 (0.2787)	0.057	0.5564 (0.2732)	0.042
Firm's growth	-0.1222 (0.1467)	0.405	-0.2842 (0.1566)	0.070	-0.2457 (0.1569)	0.117
TMT's size	0.2909 (0.1699)	0.087	0.1994 (0.1438)	0.166	0.2104 (0.1436)	0.143
CEO's gender	0.6704 (0.4725)	0.156	1.2684 (0.4040)	0.002	1.1909 (0.4032)	0.003
CEO's age	0.0755 (0.2185)	0.730	-0.1522 (0.1899)	0.423	-0.1726 (0.1944)	0.375
CEO's tenure	0.3756 (0.1783)	0.035	0.2788 (0.1542)	0.071	0.2741 (0.1559)	0.079
CEO's authority	-0.1742 (0.1662)	0.295	-0.1840 (0.1403)	0.190	-0.2222 (0.1419)	0.117
CEO's MBA	-0.0728 (0.3326)	0.827	0.1709 (0.2930)	0.560	0.2215 (0.2869)	0.440
Same gender	0.1034 (0.2418)	0.669	0.0566 (0.2417)	0.815	0.0259 (0.2502)	0.918
Age difference	-0.1743 (0.1426)	0.222	0.0742 (0.1291)	0.565	0.1031 (0.1314)	0.433
Together in the TMT	0.0550 (0.1300)	0.672	0.1233 (0.1314)	0.348	0.1332 (0.1330)	0.316
Decision dummies	YES		YES		YES	
Industry dummies	YES		YES		YES	
Geographical dummies	YES		YES		YES	
Constant	-0.5048 (0.7375)	0.494	-0.4192 (0.6858)	0.541	-0.3482 (0.6904)	0.614
Observations	902		902		902	
Number of clusters (firms)	109		109		109	
R <sup>2</sup> (Efron)	0.188		0.270		0.281	
ΔR <sup>2</sup>	-		0.083		0.011	
Log likelihood	-514.493		-467.364		-463.379	
DF	43		46		48	
LR(χ <sup>2</sup> )	180.268		274.526		282.496	
ΔLR(χ <sup>2</sup> )	-		94.258		7.970	
Prob>LR(χ <sup>2</sup> )		0.000		0.000		0.000
Prob>ΔLR(χ <sup>2</sup> )		-		0.000		0.000

Robust standard errors in parentheses.

For Model 2, ΔLR(χ<sup>2</sup>) is computed considering it nested on Model 1; for Model 3, it is the corresponding value when the model is nested on Model 2.

**Table 5.** Average Marginal Effects and first difference of the simulated probability of delegation of decision authority by the CEO to the manager on the models presented in Table 3

<b>Model 2</b>	Average Marginal Effect	p-value	First difference mean → +1 s.d.	p-value
CEO's decision-workload	0.1866 (0.0279)	0.000	0.2138 (0.0309)	0.000
CEO's work experience	-0.0360 (0.0204)	0.077	-0.0492 (0.0283)	0.079
Manager's work experience	0.0132 (0.0177)	0.458	0.0178 (0.0229)	0.436
<b>Model 3</b>	Average Marginal Effect of CEO's work experience	p-value	First difference CEO's work experience mean → +1 s.d.	p-value
CEO's decision-workload = p(10)	-0.0707 (0.0316)	0.025	-0.0867 (0.0355)	0.034
CEO's decision-workload = mean	-0.0398 (0.0217)	0.066	-0.0635 (0.0323)	0.043
CEO's decision-workload = p(90)	-0.0114 (0.0222)	0.607	-0.0123 (0.0253)	0.638
<b>Model 3</b>	Average Marginal Effect of Manager's work experience	p-value	First difference Manager's work experience mean → +1 s.d.	p-value
CEO's decision-workload = p(10)	-0.0337 (0.0307)	0.271	-0.0417 (0.0364)	0.267
CEO's decision-workload = mean	0.0144 (0.0183)	0.432	0.0114 (0.0245)	0.642
CEO's decision-workload = p(90)	0.0408 (0.0200)	0.041	0.0422 (0.0184)	0.032

Robust standard errors in parentheses.

Average Marginal Effects are calculated using the Delta method. The simulations results are based on drawing 1,000 values of the probability of delegation of decision authority by the CEO to the manager.

In the following, we present the results of our estimations. In previous Table 4 logit estimations are reported, while Table 5 provides the Average Marginal Effects and the first differences of the main explanatory variables to help the interpretation of results.

The first of the three models (Model 1) includes only the control variables. Taking into consideration Average Marginal Effects, the probability that the CEO delegates a strategic decision to the corresponding manager increases with the increase in the *TMT's size*<sub>*i*</sub> and the *CEO's tenure*<sub>*i*</sub>. Specifically, the size of the TMT has an AME of 5.64 percentage points (p-value = 0.083), while the one of the tenure of the CEO is equal to 0.073 percentage points with a p-value of 0.034. Excluding industry, geographical and decision dummies, these are the only controls significant in Model 1. However, once included the main independent variables in the model (Model 2) also the size of the firm (AME = 0.044, p-value = 0.073), its growth (AME = -0.049, p-value = 0.061), the fact that it is a subsidiary (AME = 0.092, p-value = 0.053), and CEO's gender (AME = 0.219, p-value = 0.001) show a significant effect. Interesting enough, Model 1 gives an indication of which strategic decisions are usually delegated by the CEO to the corresponding manager. These decisions

concern the entry or exit from markets/product lines; radical changes in organizational processes and organizational procedures and in the organizational structure; strategic alliances/partnership with other firms or organizations and major business investments; hiring, firing, promotions, salaries and incentives for middle management; expansion of production capability, expansion and modernization of production equipment and plants; significant investments in information and communication technology; and the definition of the sustainability strategy for the civil society development<sup>9</sup>.

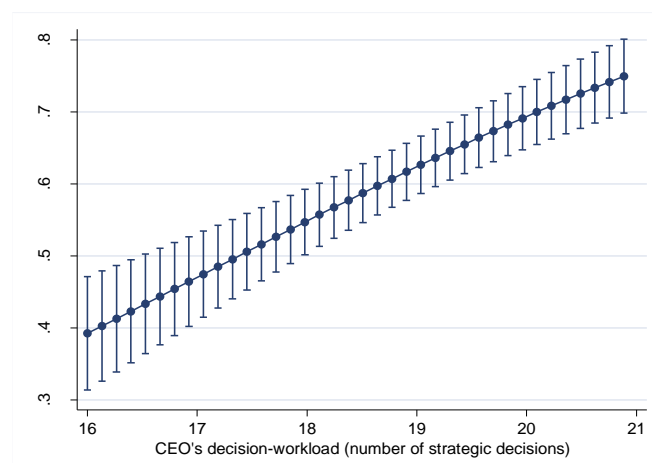
The second model (Model 2) adds to the controls the direct effect of the three main independent variables: *CEO's decision-workload<sub>ij</sub>*, *CEO's work experience<sub>ij</sub>*, and *Manager's work experience<sub>ij</sub>*. As it is reported in Table 5, only the first two influence the probability of CEO's delegation. The Average Marginal Effect of *CEO's decision-workload<sub>ij</sub>* is significant (p-value = 0.000) and positive (AME = 0.187). This means that the increase in the workload leads the CEO to delegate a strategic decision to the manager; this effect is well represented by Figure 2. The result is also confirmed by the simulation approach (King et al., 2000). Specifically, first we used the estimation of Model 2 to defined one value of the coefficient vector from a multivariate normal distribution, which mean is equal to the estimates of the coefficients and the variance matrix is equal to the estimated variance-covariance matrix of the estimates. Second, all the variables with the exception of *CEO's decision-workload<sub>ij</sub>* were set at their mean value. Third, we computed the predicted probability of *Delegation<sub>i</sub>* for two alternative values of *CEO's decision-workload<sub>ij</sub>*: at the mean and at the mean plus one standard deviation. Fourth, we calculated the first difference in the predicted probability of delegation of decision authority over a strategic decision by the CEO when the decision-workload increases of a standard deviation. Fifth, we repeated these steps for 1,000 times<sup>10</sup> to obtain an approximate distribution of the first difference. Applying the simulation approach, we found a positive first difference equal to 0.214 percentage points and with the same level of significance (p-value = 0.000). We can thus conclude that the first hypothesis that the increase in the decision-workload increases the probability that the CEO delegates a strategic decision to the corresponding manager is confirmed (H1). Also the second hypothesis is confirmed by Model 2. However, in this case the decision-specific knowledge possessed by the CEO has an opposite effect on the probability that s/he delegated a strategic decision to the manger compared

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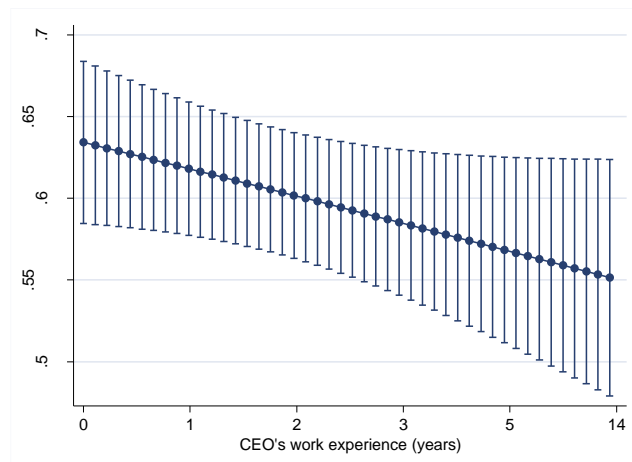
<sup>9</sup> The remaining decisions do not have a significant relation with delegation. The only exception are the strategic decisions about purchases, which are positive and significant (AME = 13.79%, p-value = 0.068), but only in Model 1.

<sup>10</sup> To check the robustness of the results of the King et al.'s (2000) method, we repeated the simulation for 5,000 and 10,000 times. In so doing, we obtained similar results. Results are available from the authors upon request.

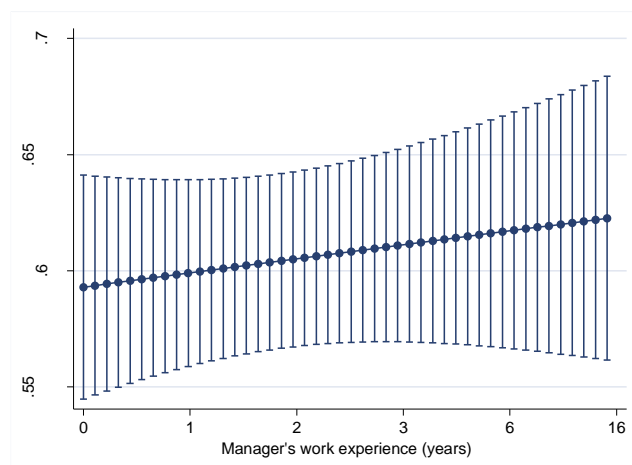
to CEO's decision-workload (see Figure 2). Indeed, the AME of *CEO's work experience<sub>ij</sub>*, is equal to -0.036 percentage points and significant (p-value = 0.077). Quite the same result emerged applying the simulation approach. In this case, the first difference is equal to -0.049 percentage points and the p-value is 0.079. The significance of the negative relation between *CEO's work experience<sub>ij</sub>* and *Delegation<sub>i</sub>* can be noticed also looking at Figure 3. Thus, the second hypotheses that contend that the increase in the decision-specific knowledge possessed by the CEO decreases her/his tendency to delegate that strategic decision to the manager is confirmed (H2). A different result emerged instead for the *Manager's work experience<sub>ij</sub>*. In this case the Average Marginal Effect is positive and in line with the hypothesis (AME = 0.013), but it is not significant (p-value = 0.458). The simulation approach led to the same result of the Delta method, with a first difference of 0.018 percentage points and a p-value of 0.436. Consequently, our third hypothesis (H3) is rejected as, contrarily to it, the increase in the decision-specific knowledge of the manager who would be in charge of the strategic decision if delegated does not influence the probability that the CEO delegates that decision to the manager.



**Figure 2.** Predicted probability of delegation of decision authority as a function of CEO's decision-workload (95% confidence interval)



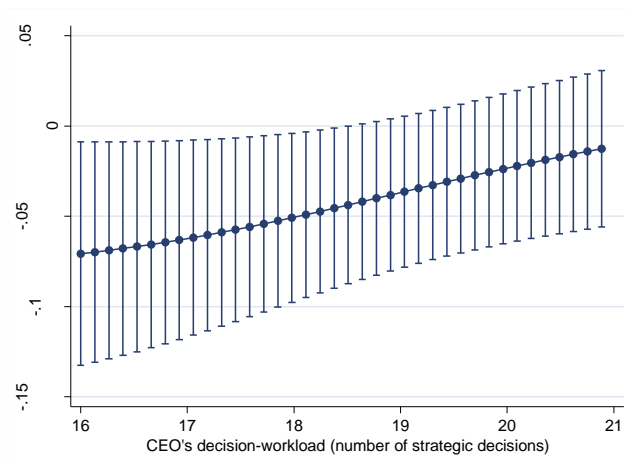
**Figure 3.** Predicted probability of delegation of decision authority as a function of CEO's work experience (95% confidence interval)



**Figure 4.** Predicted probability of delegation of decision authority as a function of manager's work experience (95% confidence interval)

The third model (Model 3) includes the interactions of the decision-specific knowledge of the CEO and the manager with the decision-workload of the CEO to test hypotheses 4 and 5. For both the interactions we computed Average Marginal Effect of *CEO's work experience<sub>ij</sub>* and *Manager's work experience<sub>ij</sub>* (respectively) through the Delta method at three alternative values of *CEO's decision-workload<sub>i</sub>*: a low value (tenth percentile), the mean, and a high value (ninetieth percentile). Then, we applied the simulation approach to find a confirmation for the results. First, we computed the first difference following the same procedure described above, but repeating the calculation for the three alternative values of *CEO's decision-workload<sub>i</sub>* just mentioned. Then, we computed the difference in the first difference, repeating the procedure for 1,000 times. In H4 we hypothesize that the negative effect of CEO's decision-specific knowledge is weakened by the increase in CEO's decision-workload and the results confirm this hypothesis. Indeed, Figure 5 shows that the Average Marginal Effect of *CEO's work experience<sub>ij</sub>* is negative and significant for a low values of decision-workload, then it increases (i.e., it becomes less negative) with the increase

in the decision-workload until a value of 0.88 (approx. 18 strategic decisions), starting from which it loses its significance. The same effect is presented by Table 4. The AME of *CEO's work experience<sub>ij</sub>* is negative and significant (AME = -0.071, p-value = 0.025) for a low value of *CEO's decision-workload<sub>i</sub>* (tenth percentile, i.e., 0.75, approx. 16 strategic decisions), it increases and is still significant (AME = -0.040, p-value = 0.066) at the mean of *CEO's decision-workload<sub>i</sub>* (i.e., 0.89, approx. 19 strategic decisions), while it is not significant (AME = -0.011, p-value = 0.607) when the *CEO's decision-workload<sub>i</sub>* is high (ninetieth percentile, i.e., 1, 21 strategic decisions). Results of the simulation approach are fully in line with those of the Delta method. Specifically, the first difference is equal to -0.087 percentage points (p-value = 0.034) when *CEO's decision-workload<sub>i</sub>* is low, it increases to -0.064 percentage points (p-value = 0.043) when the decision-workload is at the mean value, and it is not significant (p-value = 0.638) when the *CEO's decision-workload<sub>i</sub>* is high.

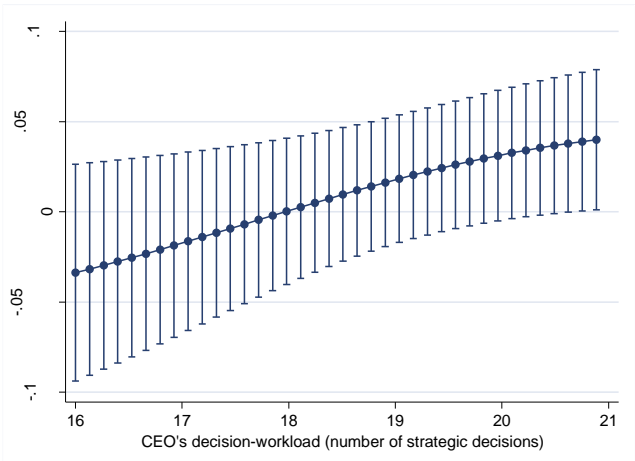


**Figure 5.** Average marginal effect of CEO's work experience over CEO's decision-workload (95% confidence interval)

In the fifth hypothesis (H5) we posit that the positive effect of manager's decision-specific knowledge hypothesized in H3 is strengthened by the increase in CEO's decision-workload. Results partially confirm this hypothesis in the sense that when the decision-workload is low the decision-specific knowledge of the manager does not matter, while when the decision-workload is high, this knowledge matters and positively influence delegation by the CEO to the manager. This effect is represented by the Average Marginal Effect of *Manager's work experience<sub>ij</sub>* in Figure 6, which is negative but not significant for low values of *CEO's decision-workload<sub>i</sub>*, it increases with the increase in the decision-workload and it becomes positive and significant starting from a value of 0.99, thus only when the CEOs has the maximum decision-workload of 21 strategic decisions. This effect is demonstrated also by the Average Marginal Effects in Table 4. The AME of *Manager's work experience<sub>ij</sub>* is negative but not significant (AME = -0.034, p-value = 0.271) for a low value of



*CEO's decision-workload<sub>i</sub>* (i.e., 0.75, 16 strategic decisions), it is positive and still not significant (AME = 0.014, p-value = 0.432) at the mean of *CEO's decision-workload<sub>i</sub>* (i.e., 0.89, 19 strategic decisions), while it is positive and significant (AME = 0.041, p-value = 0.041) when the *CEO's decision-workload<sub>i</sub>* is high (i.e., 1, 21 strategic decisions). Also in this case, results of the simulation approach are completely in line with those of the Delta method. In details, the first difference is not significant when *CEO's decision-workload<sub>i</sub>* is low (p-value = 0.0267) and at his mean (p-value = 0.642), and it is equal to 4.22 percentage points and significant (p-value = 0.032) when the *CEO's decision-workload<sub>i</sub>* is high.



**Figure 6.** Average marginal effect of manager's work experience over CEO's decision-workload (95% confidence interval)

**Robustness checks**

The need to test the robustness of our results emerges as results may be influenced by the way in which we decided to measure the main independent variables of our study or by the absence in the models of some possible confounding factors that may influence delegation by the CEO to the manager. Therefore, we propose here several robustness checks whose aim is to test the reliability of our findings. Results are available from the authors upon request.

The first set of robustness checks concerns the way in way in which we measured the decision-specific knowledge possessed by CEOs and managers. In the main analysis we considered the numbers of years of work experience in the functional areas (and roles) associated with the strategic decision taken into account. Here, we propose some alternative measures. First, we measured *CEO's work experience<sub>ij</sub>* of the CEO transforming the continuous variable in a dummy that is equal to 1 in case the CEO worked at least one time in at least one of the functional areas (and roles) associated with the decision; in other words, the dummy equals 1 in case the continuous variable is different from 0. Second, we did the same for managers. However, in this

case we considered as threshold a number of years equal to 5. Thus, we created a dummy variable that is equal to 1 in case the managers worked in the functional areas (and roles) associated with the strategic decision for more than 5 years. Third, we considered jointly these two alternative measures of *CEO's work experience<sub>ij</sub>* and *Manager's work experience<sub>ij</sub>*. In all these cases, results are fully in line with those of the main estimations. Lastly, we modified the continuous variable of *Manager's work experience<sub>ij</sub>* considering not only the work experience before being appointed in the TMT, but also the one developed working in the TMT itself. In this case, results concerning the decision-workload and the decision-specific knowledge of the CEO are still confirmed, while it is not the same for the manager. Indeed, his decision-specific knowledge does not matter even for the highest level of CEO's decision-workload. The same result emerged with the simulation approach.

Concerning the control variables, we did some robustness checks on those referring to the characteristics of the CEO and the manager. First, we used instead of the difference in age between the CEO and the manager, the similarity between their ages (*Age similarity<sub>ij</sub>*). We measured this variable as the absolute value of the difference between the age of the CEO and the one of the manager. Second, we included in the set of controls the level of variable compensation for both the CEO and the TMT on average (which is a proxy of the manager's variable compensation). We retrieved variable compensation from the questionnaire that CEOs filled in. Specifically, we asked CEOs to evaluate her variable compensation and the one of the managers in the TMT (on average), over the last three years, using the following six points scale: 1 = 0%; 2 = between 0% and 10%; 3 = between 10% and 20%; 4 = between 20% and 30%; 5 = between 30% and 50%; 6 = more than 50%. Third, we took into account whether the CEO of the firm was a member of the family owning the firm. In so doing, we substituted the *Family firm<sub>i</sub>* variable with another dummy variable (*Family<sub>i</sub>*) that was equal to 1 in case the firm is both family owned and family managed. Lastly, we decided to drop from models the dyadic variables (i.e., *Same gender<sub>ij</sub>*, *Age difference<sub>ij</sub>*, *Together in the TMT<sub>ij</sub>*), replacing them with three similar variables representing only the characteristic of the manager. The new variables are: *Manager's gender<sub>ij</sub>* (i.e., a dummy variable equal to 1 in case the manager is a woman), *Manager's age<sub>ij</sub>*, and *Manager's tenure<sub>ij</sub>* (i.e., the number of years since the manager was part of the TMT of the focal firm). In all these cases, new estimations confirm that results are robust. Also in these cases, results of the simulation approach are consistent.

The last robustness check we did consider CEO's and manager's decision-specific knowledge simultaneously. This means that we substitute the variables *CEO's work experience<sub>ij</sub>* and *Manager's work experience<sub>ij</sub>* with three dummy variables that measure whether: (i) *Both CEO and manager have work experience<sub>ij</sub>*; (ii) *Only CEO has work experience<sub>ij</sub>*; (iii) *Only manager has work experience<sub>ij</sub>*. Residual to these three dummy is the one indicating that *Neither CEO nor manager has work experience<sub>ij</sub>*. Basing on AME and first differences, results are consistent with those of the main estimation. The decision-workload has a positive relation with delegation, while delegation decreases when only the CEO has knowledge or both the CEO and the manager possess decision-specific knowledge (compared to a situation in which neither of the two is competent). The magnitude of *Only CEO has work experience<sub>ij</sub>* is greater than the one of *Both CEO and manager have work experience<sub>ij</sub>*; this means that the CEO delegates more when also the manager is competent in the decision domain. Coherently with the main estimates, both the aforementioned dummies are significant only for low values of decision-workload. Thus, the CEO may base her decision on her knowledge and the one of the manager only if she is not too much time constrained. When the decision-workload is high, instead, the CEO is forced to delegate and she is likely use her knowledge to monitor the manager's behavior.

## DISCUSSION AND CONCLUSION

In this paper, we go further in the empirical study of the determinants of delegation. Specifically, we study whether the DAH's decision-workload and the decision-specific knowledge of the DAH and the DAR affects delegation by the DAH to the DAR. In so doing, we address the delegation of strategic decisions in the dyadic relation between the CEO and the TMT manager responsible for the domain of the specific decision analyzed. Results of the logit estimates on a decision-level sample of 902 observations partially confirm our hypotheses. First, estimates confirms the results of Dobrajska et al. (2015). Also at this level of analysis, the increase of the DAH's decision-workload induces her to delegate decision authority, as, taken a strategic decision, the CEO is more likely to delegate it to the TMT manager responsible of that decision domain. Indeed, CEOs are usually time constrained (Chandler, 1962; Penrose, 1959) and, to avoid excessive information processing compared to their cognitive capacity (March & Simon, 1958; Rivkin & Siggelkow, 2003), which may lead to lower decision-making effectiveness (Gavetti et al., 2007; Mendelson, 2000; Ocasio, 2011; Simon, 1982), they prefer to delegate decision authority downward the hierarchy. The opposite effect is found for CEO's decision-specific knowledge as an increase in this knowledge leads the CEO to delegate less decision authority. When the CEO is well informed she retains decision

authority (Philippe Aghion & Tirole, 1997) to co-locate decision authority and knowledge (Hayek, 1945; Jensen & Meckling, 1992) and thus using available knowledge optimally (Hayek, 1945) and improving the quality of the decision. The negative effect of DAH's decision-specific knowledge increases with the increase in the decision-workload but it is significant only when the amount of strategic decisions under her responsibility is limited. When the decision-workload is too high, the CEO is thus forced to delegate decision authority and she uses the knowledge she possesses to delegate to the proper TMT manager and to monitor his behavior and decision-making, also reducing the possible problem of loss of control (Hayek, 1945; Jensen & Meckling, 1976). Considering instead the decision-specific knowledge of the TMT manager, our hypothesis on a possible positive relation with delegation does not find confirmation. Therefore, the knowledge possessed by the DAR does not seem to matter in DAH's decision to allocate a strategic decision to the DAR. A possible explanation is that, to be nominated as members of the TMT, managers need to possess a great amount of knowledge on the decision domains for which they are responsible, as the internal promotion or the hiring reasonably bases on this knowledge and competences. Thus, their knowledge does not make difference in the allocation of decision authority by the CEO as she is likely to know that managers are knowledgeable. What makes the difference is the decision-specific knowledge of the CEO as she is the person that receives decision authority from the board and has to decide how to manage it. However, data reveal that DAR's decision-specific knowledge matters when the decision-workload is at its maximum (i.e., the CEO is in charge of all the strategic decisions that the firm has to make). In this situation, as aforementioned, the DAH is forced to delegate decision authority and, in choosing what strategic decisions to delegate, she will start from those whose DAR is more knowledgeable. This allows to avoid communications that might suffer from loss of information (Dessein, 2002).

With our study we contribute to the delegation literature in different directions. First, we go deeper in the study on how knowledge affects delegation by focusing not only on the decision-specific knowledge of the DAH, but also on that of the DAR. Indeed, delegation literature has empirically tested only the effect of the former (e.g., Dobrajska et al., 2015), disregarding the latter. Second, focusing on the delegation of strategic decisions in the dyadic relation between the CEO and the TMT manager responsible for the specific decision domain we depart from the typical levels of analysis adopted in the delegation literature. Some examples are the firm level or the plant level (e.g., Acemoglu et al., 2007; Phillippe Aghion, Bloom, & Van Reenen, 2014; Bloom et al., 2009, 2010; Bloom & Sadun, 2012; Colombo & Delmastro, 2008) or specific types of decisions and

functional areas within the firm (e.g., IT decisions, Brown & Magill, 1998, or financial ones, Graham, Harvey, & Puri, 2015, the R&D function, Arora, Belenson, & Rios, 2014). It is also worth mentioning that analyzing DAH's and DAR's decision-specific knowledge we contribute to the growing debate on the importance of individual characteristics in organizations (e.g., Barney & Felin, 2013; Devinney, 2013; Felin, Foss, Heimeriks, & Madsen, 2012).

This study is not devoid of limitations, which provide suggestions for future developments. First, other characteristics apart from knowledge may matter in the allocation of decision authority. A deeper study of the determinants of delegation would allow to understand whether decision authority over a strategic decision is allocated following rational principles. Otherwise, allocation is likely to be suboptimal, leading to detrimental decisions. For instance, delegation may be driven by personality traits, the common ground shared by the DAH and the DAR, cultural aspects depending on where they were born and have grown up, etc. Second, some characteristics of the TMT in which the manager operates may be relevant, as to make a strategic decision the manager may need to communicate with the other managers, thus influencing him in making coordinated and globally optimal decisions. Trust, formal and informal coordination, and communication may influence the decision-making of the manager, and thus the likelihood that the CEO delegates a strategic decision to him. Third, despite our findings move delegation studies to a new level of analysis, our estimates are based on a sample containing only Italian firms. Therefore, there might be problems of generalizability of results, which may not apply to different countries (and cultures). A replication of the study in a diverse context is thus suggested.

Despite these limitations, we are confident that our paper may advise top managers on the delegation of strategic decisions. The paper suggests how the decision-workload of the CEO plays a fundamental role in her delegation policy. When the decision-workload of the CEO increases, she is more and more likely to delegate decision-authority to TMT managers. At the same time, the more the CEO has decision-specific knowledge, the more she is able to make a decision by herself, without giving responsibilities to the manager in the TMT. However, when the CEO is too busy, TMT managers have to be ready to take responsibility over strategic decisions, as it is likely that the CEO delegates decision authority to them, despite the knowledge she possesses. In so doing, priority is likely given to managers more knowledgeable, i.e., those that possess greater decision-specific knowledge. CEOs have to remind that investing in their knowledge and diversifying their work experiences (as to be knowledgeable in a greater number of strategic decision) is fundamental. Indeed, this kind of knowledge on one hand allows them to make good

quality decisions when their decision-workload is limited, on the other hand it allows to manage decision authority over strategic decision when the decision-workload is high, understanding to whom delegate it and being able to monitor the decision-making of the recipient.

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## APPENDIX

**Table 6.** Association between decisions and functional areas

ID	Decision	Functional areas <sup>a</sup>
1	Developing innovative products and services	R&D, production, marketing
2	Introducing significant changes in products and services	R&D, production, marketing
3	Developing sustainable products (environmental-friendly or socially-oriented)	Sustainability, R&D, production
4	Introducing major changes in marketing activities	Marketing, sales, production
5	Entry or exit decisions from markets/product lines	Business development, marketing, sales
6	Major price decisions	Marketing, sales, business development
7	Radical changes in organizational processes and procedures	HR, administration
8	Significant changes in the organizational structure	HR, administration
9	Strategic alliances / partnership with other firms or organizations (acquisitions and joint venture are not included)	Business development, finance, supply chain, purchasing
10	Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)	Business development, finance
11	Hiring, firing, promotions, salaries and incentives for the middle management	HR, administration
12	Labor disputes with unions	HR, legal, administration
13	(Re)design of management control systems (e.g., planning, budgeting, controlling)	Administration, finance
14	Main financing decisions (e.g., choice of capital providers, relations with the banking system)	Finance, administration
15	Strategic decisions about purchases (e.g., major supplier selection)	Supply chain, purchasing, production
16	Strategic decisions about production insourcing/outsourcing	Supply chain, purchasing, production
17	Expansion of production capability, expansion and modernization of production equipment and plants	Production
18	Significant investments in information and communication systems	ICT, administration
19	Definition of the sustainability strategy for the improvement of the work conditions (e.g., employee empowerment, health and safety programs, training, diversity and equal opportunities management)	Sustainability, HR, administration
20	Definition of the sustainability strategy for the development of the civil society (e.g., local community development, anti-corruption practices)	Sustainability, HR
21	Definition and implementation of environmental initiatives (e.g., reduction of consumption or recycling of raw materials, energy and water, reduction of emissions and wastes)	Sustainability, production

<sup>a</sup> Functional areas are in priority order.

**Table 7.** Association between decisions and functional areas for the definition of decision-specific knowledge

ID	Decision	Functional areas and roles <sup>a</sup>
1	Developing innovative products and services	Business development, marketing, production, R&D
2	Introducing significant changes in products and services	Business development, production, R&D
3	Developing sustainable products (environmental-friendly or socially-oriented)	Production, R&D, sustainability
4	Introducing major changes in marketing activities	Marketing, sales
5	Entry or exit decisions from markets/product lines	Business development, marketing, sales
6	Major price decisions	Marketing, sales
7	Radical changes in organizational processes and procedures	Administration, CEO, HR, general manager
8	Significant changes in the organizational structure	Administration, CEO, HR, general manager
9	Strategic alliances / partnership with other firms or organizations (acquisitions and joint venture are not included)	Business development, CEO, general manager, purchasing, supply chain
10	Major business investments (e.g., acquisitions, joint ventures, creation of new firms, opening new plants, creation of new infrastructures)	Business development, CEO, finance, general manager
11	Hiring, firing, promotions, salaries and incentives for the middle management	Administration, HR
12	Labor disputes with unions	Administration, HR, legal
13	(Re)design of management control systems (e.g., planning, budgeting, controlling)	Administration, finance
14	Main financing decisions (e.g., choice of capital providers, relations with the banking system)	Finance
15	Strategic decisions about purchases (e.g., major supplier selection)	Purchasing, supply chain
16	Strategic decisions about production insourcing/outsourcing	CEO, general manager, production, purchasing, supply chain
17	Expansion of production capability, expansion and modernization of production equipment and plants	Production
18	Significant investments in information and communication systems	ICT
19	Definition of the sustainability strategy for the improvement of the work conditions (e.g., employee empowerment, health and safety programs, training, diversity and equal opportunities management)	HR, sustainability
20	Definition of the sustainability strategy for the development of the civil society (e.g., local community development, anti-corruption practices)	HR, sustainability
21	Definition and implementation of environmental initiatives (e.g., reduction of consumption or recycling of raw materials, energy and water, reduction of emissions and wastes)	Legal, production, sustainability

<sup>a</sup> Functional areas are in alphabetical order.

ANNEX 3

## Opportunity Exploitation and TMT Organizational Configurations

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### ABSTRACT

In this paper, we jointly consider the organization of the Top Management Team (TMT) and the exploitation of opportunities by firms. Specifically, we study whether different ways to combine six main organizational elements of the TMT (i.e., different TMT configurations) relate to opportunities exploited by the firm. Applying a cluster analysis to a sample of 237 Italian firms, collected through a large-scale survey addressed to CEOs, we find three well-characterized clusters, which deploy different configurations of the selected organizational elements. We label these configurations as CEO centric TMT, integrated TMT, and incentive based TMT. Then, we find that these TMT organizational configurations are associated with different levels of opportunity exploitation. In particular, integrated TMT and incentive based TMT perform better in exploiting opportunities in general and innovation opportunities (i.e., related to changes in processes, products and markets). Moreover, integrated TMT is positively related to change opportunities (i.e., associated with changes in the organization).



## INTRODUCTION

Opportunity exploitation (i.e., “the deployment of resources, actions, and investments to realize recognized opportunities”, Foss et al., 2013, p. 1453) is an important capability that can strongly influence firms’ performance (op. cit., 2013). Nevertheless, to date, its organizational antecedents have gone rather under-remarked and we consider this a relevant gap. In particular, it would be reasonable to expect that the organization of the Top Management Team (TMT) does matter in opportunity exploitation. Indeed, such an endeavor requires strategic decision-making by the TMT (in defining which opportunities to pursue, what resources to mobilize to this end, what actions to implement, and the amount of investments needed), which is in turn influenced by its organization. Along this line of reasoning, we move from the premise that the organization of the TMT consists in several complementary elements (Ennen and Richter, 2010), which call for a configurational approach, and study whether configurations of these elements are associated with different levels of opportunity exploitation and whether they are equi-final (i.e., they lead to the same outcome, Fiss, 2007). In so doing, we also distinguish between different kinds of opportunities.

The paper tries to fill the aforementioned gap advancing received knowledge in several directions. First, the literature on opportunity exploitation has disregarded the role of organizational elements in determining the amount of opportunities exploited by the firm. The only exceptions are the works of Foss et al. (2013, 2015), which have found a positive relation between the amount of opportunities exploited and the level of delegation, formalization, and use of coordination mechanisms within the firm. Moreover, these contributions, as other studies on opportunity exploitation, focus on the general firm level, without considering the key role of the TMT. In addition, this literature has failed in acknowledging that firms usually face diverse kinds of opportunities, whose exploitation likely requires diverse organizational arrangements. Lastly, in filling this gap, we also contribute to the literature on TMTs. Indeed, to the best of our knowledge, TMT literature has usually studied TMT organizational elements separately, thus implicitly assuming that complementarities among them do not play any role in the decision-making of the TMT and ultimately on its performance.

We test our conjectures on data we gathered through a large-scale survey addressed to CEOs of Italian firms. Starting from a sample of 6,108 firms, due to difficulties in retrieving contact information, we administered a structured questionnaire to 3,899 CEOs of Italian firms and we obtained a usable sample of 241 questionnaires. However, the sample used in this work consists

of 237 firms, as responses by four CEOs contained missing data on the variables included in the analyses. To identify TMT configurations, we applied a two-step cluster analysis to the following organizational elements: TMT delegation, TMT incentives, TMT coordination, TMT communication, TMT size, and TMT formalization. In so doing, we identified three well-characterized clusters that we labeled as *CEO centric TMT*, *integrated TMT*, and *incentive based TMT*. Among other things, CEO centric TMTs show a low level of delegation, coordination, and variable compensation. Conversely, the remaining configurations present a high level of delegation, which, in order to align TMT members' objectives, is coupled with a high use of coordination mechanisms in the integrated TMT, and a high use of incentives in the incentive based TMT. Then, applying Scheffe post hoc tests, OLS and SURE models, we found that TMT configurations do are associated with opportunity exploitation. In this regard, we made a step forward and, besides analyzing opportunity exploitation in general, we distinguished between *change opportunities* and *innovation opportunities*<sup>1</sup>. Both integrated TMTs and incentive based TMTs are positively related to opportunity exploitation in general and innovation opportunities, thus highlighting that the two configurations are equi-final in this respect. Conversely, incentive based TMTs do not have a significant relation with change opportunities, which are instead positively affected by integrated TMT.

The reminder of the paper proceeds as follows. First, we introduce our theoretical background, dealing with opportunity exploitation and how the selected TMT organizational design elements may play a role. Then, we describe how we gathered data, the sample we used in this paper, and how we operationalized variables. In the following sections, we describe the analyses we made and the results we obtained, also presenting some robustness checks. Finally, we conclude.

## THEORETICAL BACKGROUND

### TMT and opportunity exploitation

Opportunity exploitation can be a key determinant of firms' performance (Foss et al., 2013; Rauch et al., 2009). However, organizational scholars rarely went deep in its determinants. Only recently, Foss et al. (2013, 2015) analyzed the linkages among delegation, formalization, coordination mechanisms and opportunity exploitation, finding a positive effect between the three organizational elements and the exploitation of opportunities by the firm. Conversely, the

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<sup>1</sup> Change opportunities consist in changes in the organization, while innovation opportunities refer to changes in processes, products, and markets. See the *research methodology* section for a description of the creation of the variables corresponding to these two types of opportunities.



remaining contributions on opportunity exploitation have been primarily performed in the entrepreneurship field in relation to a plethora of diverse aspects. These include: the use of the strategic marketing planning in entrepreneurial ventures (Sager and Dowling, 2009); the timing of opportunity exploitation (Choi et al., 2008); the entrepreneurial decision to start exploiting opportunities (Choi and Shepherd, 2004); the role of entrepreneurial experience (Ucbasaran et al., 2003).

All these contributions, included those by Foss and colleagues (2013, 2015), analyze the firm in general, without acknowledging the role of TMTs. However, once identified opportunities, exploiting them requires defining which opportunities to pursue, what resources to use to exploit them, what actions to implement, and the amount of investments needed. In sum, none can deny that opportunity exploitation requires making strategic decisions, whose responsibility typically resides at the TMT level. Indeed, TMTs are formed by those managers involved in deciding the large and strategic issues facing the firm, thus involved in the strategic decision-making (Amason, 1996, Collins and Clark, 2003). Notably, prior research indicates that the TMT will yield stronger explanations of organizational outcomes than will the customary focus on the individual top executive (e.g., CEO) alone (Hambrick, 2007).

### **TMT organizational elements and their complementarities**

Being the TMT an aggregation of individuals, we believe that its organization can significantly influence how they are organized to produce organizational outcomes such as opportunity exploitation. However, to the best of our knowledge, organizational elements have been previously empirically related to opportunity exploitation only in two works (i.e., Foss et al., 2013, 2015). Consequently, to advance knowledge in this realm, we make an effort in identifying the key organizational elements that characterize TMTs and that may be crucial for opportunity exploitation. Specifically, we identify six organizational elements that help the TMT in identifying the set of the possible opportunities that the firm might exploit, in selecting, among these, those to pursue and that better fit the firms, and in managing firm's resources and complementary assets (e.g., production and sales) (Teece, 1986) from diverse functions to effectively exploit selected opportunities. In other words, we identify the TMT organizational elements that helps exploiting opportunities.

The first relevant element is *TMT delegation*. As aforementioned, the strategic decision-making of the TMT is needed to exploit opportunities. Consequently, the right amount of decision

authority has to be delegated to the TMT members, giving them the discretion and autonomy that are needed to exploit opportunities (Foss et al., 2015). Moreover, providing decision authority to TMT members likely stimulates them to acquire new knowledge from outside (Hage and Aiken, 1967, Foss et al., 2013) and, being them responsible for diverse organizational units and areas, allows to leverage the specific knowledge they possess (Jensen and Meckling, 1992), which depends on their functional specialization (Gupta, 1984). In so doing, delegation of decision authority helps in identifying opportunities through the exploitation of the knowledge that TMT members possess or acquire. Indeed, following the reasoning of Aghion and Tirole (1997), we posit that, delegating decision authority, TMT members are incentivized to search for new opportunities, thus increasing the number of those that can be exploited by the firm. In addition, it also helps in selecting the best opportunities to exploit. Indeed, delegating decision authority to them, all the TMT members are involved in deciding which opportunities to exploit and how, thus increasing the variety of perspectives considered and taking advantage of the knowledge they possess to make optimal decisions (Jensen and Meckling, 1992).

However, once provided decision authority to TMT members, their objectives have to be aligned with those of the firm. In fact, delegation is usually associated with the loss of control problem (Dessein, 2002), meaning that agents act in their own self-interest (Colombo and Delmastro, 2008). Consequently, incentives need to be settled for TMT members, for instance defining high-powered incentives (i.e., relating variable compensation to performance outcomes, Colombo et al., 2014, Laursen and Mahnke, 2001). This, in turn, have a direct effect on individual behavior (Foss et al., 2011): incentives increase TMT members' effort (Jensen and Meckling, 1992) in searching for new opportunities and assure that they scan them choosing the ones that are the best basing on firm's interests. This means that using the right amount of *TMT incentives* may have a positive influence on the exploitation of opportunities.

As aforementioned, when a firm wants to exploit opportunities, it needs to put in motion diverse and complementary firm's assets (e.g., human resources, research and development, production, marketing, etc.). This not only implies the aforementioned delegation of decision authority or the consideration of TMT members' specific knowledge and needs, but also the need to organize these assets towards the same objective (Teece, 1986), i.e., exploiting the selected opportunity. This means that TMT members, which usually are the managers responsible for these assets, have to coordinate and communicate in order to make the exploitation of opportunities easier and effective. Indeed, *TMT coordination* and *communication* enable cross-functional

information exchange (Egelhoff, 1991, Foss et al., 2013, Cao et al., 2010) and knowledge integration (Daft and Lengel, 1986), which improve both the identification of the right opportunities and their exploitation.

Due to the need to involve diverse firm's assets and to exploit the specific knowledge possessed by the managers in charge of the organizational units that have a role in opportunity exploitation, TMTs should be as representative as possible of the whole firm. In this sense, the key role of *TMT size* emerges. Indeed, the bigger is a TMT, the higher is its functional heterogeneity (Allison, 1978, Carpenter, 2004, Zimmerman, 2008). First, this positively influences the identification of opportunities, through a better environmental scanning (Zimmerman, 2008). On the contrary, with a smaller TMT, a smaller amount of knowledge is brought in it, thus reducing the number of opportunities that can be identified, and then likely exploited. Second, having a big TMT also influences the selection and the exploitation of opportunities, allowing to better manage all the assets needed to do this. Indeed, it is reasonable to think that a bigger TMT would include and consider the needs of a higher number of firm's assets (i.e., organizational units), thus allowing to exploit opportunities in a better way, leveraging on assets complementarities. On the contrary, a smaller TMT would include fewer managers, without taking into consideration all the aspects needed to exploit opportunities in a proper way.

Lastly, also *TMT formalization* plays a role in opportunity exploitation. Despite formalization establishes patterns of organizational action (Cohen and Bacdayan, 1994, Galunic and Rodan, 1998) and, in some cases, it constrains individuals' exploration efforts restricting their attention on some specific aspects (Weick, 1979), it can also have an opposite positive effect on opportunity exploitation. Indeed, formalization helps in managing knowledge and makes it easier to identify opportunities from both internal and external one (Jansen et al., 2005). Moreover, formalization helps in organizing resources and complementary assets needed to exploit opportunities, understanding the tasks needed to do it, assuring agreement and coordination among TMT members, and speeding up exploitation (Foss et al., 2015).

To sum up, basing on our reasoning, each of the aforementioned organizational elements (i.e., *TMT delegation*, *TMT incentives*, *TMT coordination*, *TMT communication*, *TMT size*, and *TMT formalization*) can influence firm's opportunity exploitation. In general, such organizational elements have usually been analyzed in isolation (e.g., Jansen et al., 2005, Foss et al., 2011), and this is even more true for previous works on opportunity exploitation (Foss et al., 2013, 2015). However, authors suggest the need to study such elements as a combination of variables (Foss et

al., 2013), due to the complementarities that exist among them (Ennen and Richter, 2010). Generally, all firms are characterized by complementarities. For instance, Milgrom and Roberts (1990) find that there are complementarities among firm's functions (e.g., marketing, manufacturing, engineering, design, and organization); Ichniowski et al. (1997) deal with the importance of those among work practices, while, more recently, Gruber et al. (2010) consider complementarities between resources and capabilities. We posit that complementarities exist also at the TMT level, considering its organizational design. Indeed, following Ennen and Richter (2010), there are beneficial interplays among the diverse organizational elements, which in turn increase their value. This presence of complementarities raises the need to study these organizational elements simultaneously and we believe that the configurational approach could answer to this need as showed by the previous organizational and human resource management literature (e.g., Gruber et al., 2010, Mendelson, 2000). Consequently, in this paper, we apply a configurational approach at the TMT level, considering the aforementioned organizational elements; then, once identified TMT configurations, we study whether they are associated with different levels of opportunity exploitation (also distinguishing between two different kinds of opportunities) and whether they are equi-final (i.e., different configurations lead to the same outcome, Fiss, 2007).

## RESEARCH METHODOLOGY

### Data collection and sample

Our study relies on data collected through a large-scale survey. We developed a structured questionnaire that we sent to a sample of CEOs of Italian firms with more than 20 employees and operating in the manufacturing and service industries. This survey is part of a large project on TMT organizational design (i.e., the *StiMa project*) active at *Politecnico di Milano School of Management*, which focuses on TMTs to study how they are organized. Through this data collection we created a database of 241 answers. The sample is representative of the population of 50,341 Italian firms (basing on industry and geographical location) and it is characterized by a response rate of 6.18%<sup>2</sup>. Testing for non-response bias no problems emerged. Indeed, among others, we compared early vs. late respondents and we found significant differences only for four of the 59 dimensions (i.e., constructs and items) measured through the questionnaire; moreover, specifically referring to the construct and variables considered in this paper, only one difference

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<sup>2</sup> We computed the response rate considering the number of usable responses (241) and the sample of 3,899 firms for which we had the email contact of the CEO.

emerged, suggesting that non-response bias is not a problem. Lastly, we triangulated data through a second survey addressed to Chief Human Resource Officers (HRs) of the 114 firms in the sample for which we had their contact information. 43 HRs filled in the questionnaire and, also in this case, we found no differences among CEOs' and HRs' responses. See Rovelli and Rossi-Lamastra (2016) for a detailed description of the data collection procedure and of all the checks for data reliability we did. Due to missing values corresponding to the variables included in the analyses described below, the sample used in the paper consists of 237 firms and TMTs.

## Measures

Analyses are based on the following variables. Specifically, we considered three dependent variables to study both opportunity exploitation in general and two specific types of opportunities. Then, a set of variables served to identify how TMTs are organized (i.e., TMT organizational configurations), so defining our main independent variables. In this regard, we focused on the aforementioned organizational design elements: *TMT delegation*, *TMT incentives*, *TMT coordination*, *TMT communication*, *TMT size*, and *TMT formalization*. Lastly, we considered some control variables to take into account possible confounding factors in evaluating the relation between opportunity exploitation and TMT organizational configurations.

### Dependent variables on opportunity exploitation

To understand whether and how the organization of the TMT relates to the exploitation of opportunities by the firm, we considered three different dependent variables. As mentioned earlier, the first one represents *opportunity exploitation* in general, while the other two refer to specific types of opportunities: *change opportunities* and *innovation opportunities*.

To measure *opportunity exploitation* in general, we took inspiration from Foss et al. (2013). Specifically, we asked CEOs to assess the amount of opportunities exploited by the firm in the last three years, using a seven-point Likert-like scale, ranging from "no opportunities" (coded 1) to "many opportunities" (coded 7). More in detail, CEOs had to evaluate seven different types of opportunities: (i) new products and services (with the exception of marginal changes); (ii) new production technologies; (iii) entry into new markets; and (iv) changes in the organization (structure and work). Adding to these, items include new ways to manage (v) human resources (HR), (vi) research and development (R&D), and (vii) accounting and finance. *Opportunity exploitation* was measured as the average of the seven items and a higher level indicates a higher number of opportunities exploited.

Starting from this question, we made an effort in defining two different categories of opportunities that firms may exploit. Specifically, we divided the seven items in two groups. The first one was related to *innovation opportunities* and includes the followings: (i) new products and services; (ii) new production technologies; (iii) entry into new markets; and (iv) new ways to manage R&D. The second category (i.e., *change opportunities*) referred to the exploitation of opportunities associated with the organization of the firm: (i) changes in the organization (structure and work), (ii) new ways to manage HR, and (iii) new ways to manage accounting and finance. A Confirmatory Factor Analysis validated the two defined categories and the resulting factors were used to run the analyses (Cronbach's alpha were higher than 0.60).

### Independent variables: how TMTs are organized

The main independent variable of this study consists in how the TMT is organized, meaning its organizational configuration. First, we based on a set of organizational design elements to identify whether and what TMT organizational configurations exist. Second, we created a series of dummy variables, one for each TMT organizational configuration, to assess whether adopting a specific configuration is positively or negatively associated with the number and the type of opportunities exploited by the firm. More details about the number and the meaning of the dummy variables are provided once described the identified configurations (see the *results* section).

As aforementioned, to recognize TMT organizational configurations, we considered the following variables.

#### *TMT delegation*

TMT delegation refers to the level of decentralization of decision authority (Foss et al., 2013) in the TMT. To measure it, we asked CEOs to assess at which level of the firm's hierarchy a list of strategic decisions are made. We adapted the scale developed by Colombo and Delmastro (2008) and we asked to specify the lowest level that has the authority to make each strategic decision using a five-point scale (1 = CEO's corporate superior (e.g. the board of director or the CEO of the parent company); 2 = CEO; 3 = first line managers, with formal authorization by the CEO; 4 = first line managers, autonomously; 5 = middle managers). *Delegation* was computed as the average over all the decisions, excluding those taken by the superior of the CEO (i.e., with a value of 1) to consider only decisions made by the TMT (including the CEO).

### *TMT incentives*

We included two variables to evaluate the use of variable compensation within the TMT, thus representing the adoption of high-powered incentives (Gambardella et al., 2010, Laursen and Mahnke, 2001) within the team. Specifically, we considered both *CEO* and *TMT variable compensation*. Both variables were measured with a six-point scale: 1 = 0%; 2 = between 0% and 10%; 3 = between 10% and 20%; 4 = between 20% and 30%; 5 = between 30% and 50%; 6 = more than 50%. In the questionnaire, we asked the CEO to evaluate, over the last three years, the average percentage of her variable compensation and the one of the TMT members.

### *TMT coordination*

We evaluated TMT coordination considering both formal and informal coordination mechanisms. About the former, we measured the use of *formal coordination* mechanisms among TMT members with a three items factor ( $\alpha = 0.56$ ). Adapting Foss et al. (2013) measure, we evaluated the adoption of (i) formal committees, (ii) temporary cross-functional work groups (task forces), and (iii) liaison committees involving TMT members, using a seven-point Likert-like scale. CEOs were asked to indicate how often the firm uses the above mentioned coordination mechanisms, ranging from “never” (coded 1) to “very often” (coded 7). A higher value attributed to each item means a higher use of that formal coordination mechanism within the TMT. We applied a Principal Component Analysis (PCA) to the items to compute *formal coordination*.

At the same time, we took into account informal coordination considering the *tacit coordination* mechanisms used within the TMT. As the previous one, we computed this variable applying a PCA to the corresponding items. Specifically, investments in *tacit coordination* mechanisms were measured with a five items factor ( $\alpha = 0.85$ ) adapted from Srikanth and Puranam (2011). Thus, we asked CEOs to evaluate each item on a seven-point Likert-like scale, ranging the effort spent in facilitating TMT tacit coordination from “no effort” (1) to “very high effort” (7). Items include the following actions: (i) organizing team building activities to develop a common vision and mutual understanding, (ii) helping TMT members to understand other members’ decisions, and encouraging (iii) TMT meetings to understand how to better work together, (iv) the adoption of a common language in the TMT, and (v) the exchange and sharing of working experience within the TMT. Higher values attributed to each item indicate a higher effort towards the use of *tacit coordination* mechanisms.

### *TMT communication*

We used a four items factor to measure TMT communication, specifically *ongoing communication*, i.e., the adoption of information technologies to facilitate mutual adjustment among TMT members. Taking inspiration from Srikanth and Puranam (2011), we asked CEOs to rate each item on a seven-point Likert-like scale that indicates how much effort the TMT puts in each of them, ranging from “no effort” (1) to “very high effort” (7). A higher value means that the TMT relies more on communication (and remote collaboration) instruments. Items include (i) training initiatives for TMT members on remote collaboration tools, (ii) developing or adopting a dedicated IT communication network, and (iii) using electronic tools for remote collaboration and (iv) remote communication. We computed a factor basing on the responses to the four items to measure the *ongoing communication* construct ( $\alpha = 0.84$ ).

### *TMT size*

To measure the size of the TMT, we counted the number of top executives composing the TMT, thus measuring CEO’s span on control. To do so, we asked CEOs to identify and list all the TMT members.

### *TMT formalization*

We measured TMT formalization computing the average of two items adapted from Clark and Maggitti (2012), evaluated by CEOs using a seven-point Likert-like scale. Specifically, items provide an indication on (i) whether communications between TMT members mainly occur in a verbal form (1) or in a written form (7), and (ii) whether tools such as meeting agenda and minutes are “not very important” (1) or “very important” (7) in TMT decision making. Higher values indicate a higher level of *formalization*.

## **Control variables**

We controlled for several individual-, firm-, and industry-level factors that may influence the exploitation of opportunities. All the measures refer to 2013, which is the year to which the questions of the survey refer.

First, at the individual-level, we had four variables that capture the characteristics of the CEO and that can influence the way in which she organizes her TMT. First, her *gender*, a dummy variable equal to 1 if the CEO is a woman, her *tenure*, i.e., how long she holds the role of CEO in the firm, and her educational background, which was measured with a dummy variable (*CEO MBA*)



that is equal to 1 if the CEO holds an MBA. In addition to these, we had a dummy variable measuring her power in term of decision authority (*CEO decision power*), which counts the number of decision that are taken by the CEO or below and not by the firm's Board of Directors (see the question we used to measure *TMT delegation*).

Second, we included a series of variables about firms' characteristics. Specifically, we considered the *firm size*, measured as the logarithm of firm's employees in 2013, and *firm age*, expressed in logarithm. Young firms are usually more innovative than older one (Hannan and Freeman, 1984) and, because opportunity recognition and exploitation are needed to innovate (Withers et al., 2011), young firms should be incentivized to search for a great number of opportunities, increasing the probability of a higher number of opportunities exploited. The same reasoning holds for *firm size*, as small and medium enterprises ground their competitive success on innovation (Huang et al., 2002, Wolff and Pett, 2006). Then, we included other two variables obtained through the survey and referring to firm's organization: the number of *hierarchical levels* and the type of *organizational structure* adopted by the firm. The former was measured asking to the CEO to indicate the largest number of hierarchical levels between her and the last level with budget or expense responsibility; the latter consisted in four dummy variables, one for each type of organizational structure: *functional*, *divisional*, *hybrid*, and *matrix*. In addition, we also considered a dummy variable measuring whether the firm adopted an *ERP system* (coded 1 if yes, 0 otherwise). These controls served to understand whether it is not the organization of the TMT that matters in opportunity exploitation, but the one of the whole firm.

Because the firms in our sample operate in different industries and geographical areas, we also included *industry* and *geographical* dummy variables. *Industry dummies* referred to the Pavitt-Miozzo-Soete classification (Pavitt, 1984, Miozzo and Soete, 1989). We had four dummies for the manufacturing industry: (i) science based, (ii) supplier dominated, (iii) scale intensive, and (iv) specialized suppliers; while other four dummies referred to the service industry: (v) knowledge intensive business services, (vi) supplier dominated services, (vii) physical networks services, and (viii) information networks services. Residual to these eight dummies was the one related to the construction industry. For what concern the geographical location, we included *geographical area dummies*; specifically, we had three dummies representing three Italian geographical areas: North, Center, and South of Italy. We also controlled for some variables related to the governance of the firm. Specifically, we took into account whether the firm is a *family* firm and whether it is a *subsidiary*; for the former we created a dummy variable equal to 1 if the firm is both *family owned*

and family managed, 0 otherwise. Moreover, in case of subsidiaries, we also took into account whether the controlling firm was not an Italian one (*subsidiary of a foreign firm*). Lastly, we included a measure of *growth* of the firm, considering the average growth in sales in the last three years.

Third, about industry-level variables, we included two variable measuring the level of *competition* faced by the firm and the rapidity of *evolution* of the market in which it operates. We computed these variables applying a Principal Component Analysis to the question of the survey in which asked the CEO to evaluate, using a five-point Likert-like scale, whether the market size is rapidly shrinking (1) or rapidly growing (2); the technological change is very slow (1) or very rapid (5); in the market there are few (1) or many (5) competitors; and whether the competitive intensity within the industry is very low (1) or very high (5). Using a PCA, we obtained two factors: the one on the evolution of the market included the first two item, while the one on competition the last two.

## METHODS AND ANALYSES

To assess the relation between TMT organizational configurations and opportunity exploitation, we first identified configurations basing on the aforementioned variables. To this end, we performed a cluster analysis, which is a well-known technique to identify similar groups based on a specified set of variables and it has been used in previous studies on configurations in organizations (e.g., Gruber et al., 2010, Fiss, 2007). According to previous studies, we used a two-step clustering procedure (e.g., Gibson and Birkinshaw, 2004, Gruber et al., 2010). We determined the number of clusters using the hierarchical cluster analysis developed by Ward (1963), and then we assigned the 237 Italian firms in our sample to clusters using the k-means clustering method. Before performing the analysis, all variables were standardized and we checked for the presence of outliers, since cluster analysis tends to be sensitive to them. In addition, for each variable, the Scheffe pairwise comparison of means was used to determine which pairs were significantly different.

Afterward, to have a first idea on whether differences exist in the exploitation of opportunities basing on the identified TMT organizational configurations, we considered the *opportunity exploitation* variable and the seven items that compose it and we applied the Scheffe post hoc test to compare their means in the clusters. Then, we created a dummy variable for each TMT organizational configuration and we used them to go deeper in the analysis. Specifically, we used

a OLS model to assess their association with *opportunity exploitation* in general, and a SURE model to simultaneously evaluate the relation of different configurations with the two identified categories of opportunities (*change opportunities* and *innovation opportunities*). Specifically, the first model was a regression model in which the dependent variable was *opportunity exploitation* and in which only control variables were included, while in the second model we added the main independent variables representing TMT organizational configurations. Then, the third model (SURE) considered *change opportunities* and *innovation opportunities* as dependent variables and included only control variables, while the main effect of the type of TMT organizational configuration was added in the fourth, SURE model.

**Table 1.** Descriptive statistics and correlations (1)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) TMT delegation	2.69	0.44	1.00												
(2) TMT variable compensation	2.69	1.12	0.11 (0.08)	1.00											
(3) CEO variable compensation	2.92	1.58	0.08 (0.23)	0.72 (0.00)	1.00										
(4) Formal coordination	0.01	1.00	0.09 (0.17)	0.21 (0.00)	0.13 (0.05)	1.00									
(5) Tacit coordination	0.00	1.00	0.04 (0.55)	0.16 (0.01)	0.08 (0.21)	0.53 (0.00)	1.00								
(6) Ongoing communication	0.01	1.00	0.08 (0.21)	0.04 (0.49)	0.02 (0.72)	0.41 (0.00)	0.57 (0.00)	1.00							
(7) TMT size	6.42	2.93	0.24 (0.00)	0.30 (0.00)	0.25 (0.00)	0.26 (0.00)	0.23 (0.00)	0.17 (0.01)	1.00						
(8) TMT formalization	3.88	1.35	0.01 (0.94)	-0.08 (0.24)	0.04 (0.56)	0.17 (0.01)	0.16 (0.01)	0.16 (0.01)	0.07 (0.27)	1.00					
(9) Opportunity exploitation	4.10	1.08	0.12 (0.07)	0.15 (0.02)	0.11 (0.11)	0.23 (0.00)	0.34 (0.00)	0.32 (0.00)	0.13 (0.04)	0.03 (0.60)	1.00				
(10) New products and services	4.37	1.75	0.17 (0.01)	0.12 (0.08)	0.08 (0.22)	0.13 (0.05)	0.17 (0.01)	0.12 (0.06)	0.11 (0.09)	0.05 (0.44)	0.58 (0.00)	1.00			
(11) New production technology	4.03	1.83	0.14 (0.03)	0.00 (0.95)	-0.02 (0.81)	0.21 (0.00)	0.26 (0.00)	0.19 (0.00)	0.01 (0.85)	0.01 (0.82)	0.63 (0.00)	0.31 (0.00)	1.00		
(12) New markets	4.37	1.95	0.15 (0.02)	0.15 (0.02)	0.10 (0.14)	0.05 (0.47)	0.12 (0.07)	0.10 (0.14)	0.03 (0.64)	-0.15 (0.02)	0.51 (0.00)	0.36 (0.00)	0.21 (0.00)	1.00	
(13) Changes in the organization (structure and work)	4.55	1.79	0.03 (0.64)	0.16 (0.01)	0.15 (0.02)	0.20 (0.00)	0.27 (0.00)	0.22 (0.00)	0.23 (0.00)	0.08 (0.25)	0.54 (0.00)	0.12 (0.06)	0.18 (0.01)	0.06 (0.34)	1.00
(14) New ways to manage HR	4.11	1.69	-0.02 (0.76)	0.15 (0.02)	0.15 (0.02)	0.22 (0.00)	0.35 (0.00)	0.32 (0.00)	0.06 (0.36)	0.11 (0.08)	0.62 (0.00)	0.12 (0.06)	0.22 (0.00)	0.02 (0.79)	0.50 (0.00)
(15) New ways to manage R&D	3.68	1.82	0.10 (0.14)	0.08 (0.25)	0.04 (0.55)	0.07 (0.25)	0.14 (0.03)	0.14 (0.03)	0.11 (0.10)	0.01 (0.85)	0.70 (0.00)	0.36 (0.00)	0.39 (0.00)	0.30 (0.00)	0.20 (0.00)
(16) New ways to manage Accounting & Finance	3.62	1.82	-0.08 (0.21)	-0.03 (0.69)	-0.05 (0.41)	0.12 (0.06)	0.14 (0.03)	0.27 (0.00)	0.00 (0.94)	0.05 (0.46)	0.63 (0.00)	0.16 (0.01)	0.29 (0.00)	0.10 (0.13)	0.21 (0.00)
(17) Change opportunities	0.01	0.99	-0.05 (0.47)	0.09 (0.15)	0.09 (0.18)	0.22 (0.00)	0.31 (0.00)	0.32 (0.00)	0.12 (0.07)	0.12 (0.06)	0.69 (0.00)	0.06 (0.34)	0.33 (0.00)	-0.10 (0.11)	0.71 (0.00)
(18) Innovation opportunities	-0.01	1.00	0.21 (0.00)	0.10 (0.11)	0.05 (0.48)	0.11 (0.10)	0.16 (0.01)	0.13 (0.05)	0.06 (0.35)	-0.06 (0.35)	0.72 (0.00)	0.75 (0.00)	0.58 (0.00)	0.74 (0.00)	0.01 (0.88)
(19) Firm size (employees 2013)	5.36	1.46	0.19 (0.00)	0.35 (0.00)	0.33 (0.00)	0.25 (0.00)	0.21 (0.00)	0.08 (0.25)	0.49 (0.00)	-0.02 (0.76)	0.22 (0.00)	0.09 (0.17)	0.13 (0.05)	0.03 (0.62)	0.28 (0.00)
(20) Hierarchical levels	2.58	1.18	0.02 (0.73)	0.11 (0.08)	0.12 (0.07)	0.16 (0.01)	0.22 (0.00)	0.13 (0.05)	0.09 (0.17)	0.02 (0.74)	0.12 (0.08)	0.01 (0.83)	0.06 (0.35)	-0.05 (0.45)	0.11 (0.09)
(21) Divisional structure	0.11	0.32	0.04 (0.52)	0.01 (0.94)	-0.03 (0.63)	0.10 (0.13)	0.10 (0.12)	0.11 (0.10)	0.08 (0.24)	0.10 (0.12)	-0.04 (0.53)	0.05 (0.49)	-0.02 (0.77)	-0.02 (0.76)	0.06 (0.36)
(22) Hybrid structure	0.28	0.45	0.01 (0.94)	-0.02 (0.79)	0.05 (0.49)	-0.05 (0.43)	-0.14 (0.04)	-0.10 (0.12)	0.01 (0.94)	0.02 (0.79)	0.01 (0.90)	0.09 (0.16)	-0.13 (0.05)	0.02 (0.75)	0.01 (0.94)
(23) Matrix structure	0.13	0.33	0.09 (0.19)	0.16 (0.01)	0.19 (0.00)	0.23 (0.00)	0.18 (0.01)	0.13 (0.05)	0.07 (0.26)	-0.04 (0.53)	0.18 (0.01)	0.10 (0.12)	0.13 (0.05)	0.11 (0.09)	0.11 (0.09)
(24) Firm age	3.12	0.68	0.04 (0.55)	0.01 (0.84)	-0.10 (0.11)	0.04 (0.53)	0.08 (0.22)	-0.02 (0.81)	0.08 (0.24)	-0.02 (0.72)	-0.06 (0.39)	0.01 (0.93)	0.05 (0.48)	-0.03 (0.61)	-0.03 (0.62)
(25) Family owned and managed	0.33	0.47	0.12 (0.06)	-0.32 (0.00)	-0.46 (0.00)	-0.16 (0.02)	-0.25 (0.00)	-0.07 (0.26)	-0.07 (0.26)	-0.11 (0.09)	-0.12 (0.07)	-0.03 (0.68)	0.01 (0.82)	0.01 (0.89)	-0.21 (0.00)
(26) Subsidiary firm	0.49	0.50	0.10 (0.14)	0.26 (0.00)	0.38 (0.00)	0.05 (0.46)	0.12 (0.06)	0.02 (0.79)	0.22 (0.00)	0.03 (0.61)	0.04 (0.53)	0.03 (0.70)	0.02 (0.77)	0.05 (0.47)	0.16 (0.02)
(27) Subsidiary of a foreign firm	0.16	0.36	-0.08 (0.20)	0.19 (0.00)	0.24 (0.00)	0.08 (0.24)	0.10 (0.11)	0.03 (0.59)	0.12 (0.07)	0.15 (0.02)	-0.15 (0.02)	-0.06 (0.32)	-0.16 (0.01)	-0.05 (0.43)	0.06 (0.39)
(28) CEO gender	0.09	0.29	0.00 (0.97)	-0.15 (0.03)	-0.08 (0.20)	-0.07 (0.28)	-0.09 (0.16)	-0.09 (0.58)	-0.04 (0.03)	-0.14 (0.89)	-0.01 (0.52)	-0.07 (0.30)	-0.08 (0.24)	-0.01 (0.90)	-0.02 (0.79)
(29) CEO tenure	1.71	1.11	0.11	-0.14	-0.30	-0.08	-0.09	-0.03	-0.02	-0.05	-0.06	-0.01	0.03	0.10	-0.14

(30)	CEO degree	0.73	0.44	(0.09)	(0.03)	(0.00)	(0.22)	(0.17)	(0.63)	(0.73)	(0.46)	(0.36)	(0.88)	(0.63)	(0.13)	(0.04)
				-0.09	0.28	0.25	0.10	0.17	0.05	0.13	-0.03	0.13	0.14	0.04	0.09	0.14
				(0.18)	(0.00)	(0.00)	(0.12)	(0.01)	(0.45)	(0.05)	(0.62)	(0.04)	(0.03)	(0.49)	(0.15)	(0.03)
(31)	CEO decision power	2.77	0.35	0.33	0.15	0.09	0.13	0.04	0.08	0.19	-0.01	0.12	0.18	-0.03	0.14	0.06
				(0.00)	(0.02)	(0.18)	(0.04)	(0.54)	(0.23)	(0.00)	(0.88)	(0.06)	(0.01)	(0.62)	(0.03)	(0.39)
				(0.75)	(0.93)	(0.55)	(0.77)	(0.36)	(0.49)	(0.36)	(0.69)	(0.10)	(0.49)	(0.26)	(0.16)	(0.40)
(32)	Firm growth	0.07	0.17	-0.02	-0.01	0.04	-0.02	-0.06	0.04	-0.06	-0.03	0.11	0.05	0.07	0.09	0.05
				(0.92)	(0.00)	(0.02)	(0.03)	(0.09)	(0.20)	(0.00)	(0.36)	(0.00)	(0.09)	(0.22)	(0.00)	(0.01)
				(0.20)	(0.73)	(0.41)	(0.58)	(0.06)	(0.04)	(0.90)	(0.77)	(0.00)	(0.49)	(0.00)	(0.01)	(0.00)
(33)	ERP system	0.70	0.46	-0.01	0.19	0.15	0.14	0.11	0.08	0.23	0.06	0.21	0.11	0.08	0.21	0.16
				(0.92)	(0.00)	(0.02)	(0.03)	(0.09)	(0.20)	(0.00)	(0.36)	(0.00)	(0.09)	(0.22)	(0.00)	(0.01)
				(0.20)	(0.73)	(0.41)	(0.58)	(0.06)	(0.04)	(0.90)	(0.77)	(0.00)	(0.49)	(0.00)	(0.01)	(0.00)
(34)	Market competition	0.00	1.01	0.08	0.02	-0.05	0.04	0.12	0.13	0.01	-0.02	0.29	0.05	0.24	0.17	0.19
				(0.20)	(0.73)	(0.41)	(0.58)	(0.06)	(0.04)	(0.90)	(0.77)	(0.00)	(0.49)	(0.00)	(0.01)	(0.00)
				(0.59)	(0.62)	(0.15)	(0.57)	(0.10)	(0.76)	(0.99)	(0.29)	(0.02)	(0.02)	(0.06)	(0.85)	(0.52)
(35)	Market evolution	0.03	0.97	0.04	-0.03	-0.09	0.04	0.11	0.02	0.00	0.07	0.15	0.15	0.12	0.01	0.04
				(0.59)	(0.62)	(0.15)	(0.57)	(0.10)	(0.76)	(0.99)	(0.29)	(0.02)	(0.02)	(0.06)	(0.85)	(0.52)

P-values are in parentheses.

**Table 2.** Descriptive statistics and correlations (2)

	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	
(14)	1.00																						
(15)	0.30	1.00																					
	(0.00)																						
(16)	0.50	0.39	1.00																				
	(0.00)	(0.00)																					
(17)	0.87	0.41	0.69	1.00																			
	(0.00)	(0.00)	(0.00)																				
(18)	0.03	0.63	0.23	0.01	1.00																		
	(0.66)	(0.00)	(0.00)	(0.91)																			
(19)	0.24	0.15	0.02	0.24	0.07	1.00																	
	(0.00)	(0.02)	(0.77)	(0.00)	(0.30)																		
(20)	0.17	0.09	0.10	0.18	-0.01	0.38	1.00																
	(0.01)	(0.16)	(0.11)	(0.01)	(0.93)	(0.00)																	
(21)	-0.04	-0.13	-0.06	-0.04	-0.04	0.08	0.09	1.00															
	(0.55)	(0.04)	(0.33)	(0.59)	(0.58)	(0.23)	(0.15)																
(22)	0.01	0.06	-0.02	-0.02	0.03	0.08	0.07	-0.23	1.00														
	(0.89)	(0.36)	(0.74)	(0.80)	(0.67)	(0.23)	(0.27)	(0.00)															
(23)	0.15	0.09	0.07	0.13	0.12	0.17	0.10	-0.14	-0.24	1.00													
	(0.02)	(0.18)	(0.26)	(0.05)	(0.06)	(0.01)	(0.12)	(0.04)	(0.00)														
(24)	0.05	-0.19	-0.07	-0.03	-0.06	0.02	-0.08	0.04	0.00	-0.04	1.00												
	(0.40)	(0.00)	(0.25)	(0.67)	(0.36)	(0.74)	(0.25)	(0.57)	(0.96)	(0.56)													
(25)	-0.21	-0.07	-0.03	-0.19	0.03	-0.24	-0.17	0.03	-0.07	-0.19	0.14	1.00											
	(0.00)	(0.30)	(0.67)	(0.00)	(0.67)	(0.00)	(0.01)	(0.67)	(0.31)	(0.00)	(0.03)												
(26)	0.06	-0.02	-0.11	0.04	0.00	0.27	0.06	0.02	-0.01	0.01	-0.16	-0.33	1.00										
	(0.38)	(0.72)	(0.10)	(0.55)	(0.96)	(0.00)	(0.38)	(0.71)	(0.88)	(0.86)	(0.02)	(0.00)											
(27)	-0.12	-0.14	-0.16	-0.10	-0.13	-0.01	-0.03	0.03	-0.01	0.05	-0.08	-0.28	0.44	1.00									
	(0.06)	(0.03)	(0.01)	(0.11)	(0.04)	(0.83)	(0.70)	(0.66)	(0.86)	(0.48)	(0.21)	(0.00)	(0.00)										
(28)	-0.06	0.03	0.02	-0.02	-0.03	-0.13	-0.02	-0.02	0.09	-0.08	-0.04	0.05	-0.08	-0.10	1.00								
	(0.33)	(0.62)	(0.76)	(0.72)	(0.60)	(0.04)	(0.73)	(0.72)	(0.17)	(0.23)	(0.58)	(0.43)	(0.23)	(0.13)									
(29)	-0.14	-0.03	-0.08	-0.17	0.08	-0.16	-0.15	0.11	-0.04	-0.08	0.07	0.37	-0.17	-0.11	-0.07	1.00							
	(0.03)	(0.67)	(0.20)	(0.01)	(0.25)	(0.02)	(0.02)	(0.10)	(0.57)	(0.23)	(0.30)	(0.00)	(0.01)	(0.08)	(0.30)								
(30)	0.07	0.07	0.00	0.07	0.11	0.23	0.13	0.04	-0.03	0.06	-0.02	-0.20	0.14	0.05	0.06	-0.24	1.00						
	(0.30)	(0.3)	(0.95)	(0.31)	(0.09)	(0.00)	(0.05)	(0.59)	(0.70)	(0.38)	(0.81)	(0.00)	(0.03)	(0.46)	(0.35)	(0.00)							
(31)	0.07	0.11	-0.01	0.02	0.15	0.08	0.02	-0.02	-0.01	0.02	-0.03	0.08	0.02	-0.02	-0.16	0.12	0.04	1.00					
	(0.27)	(0.09)	(0.84)	(0.79)	(0.02)	(0.25)	(0.78)	(0.79)	(0.84)	(0.81)	(0.64)	(0.24)	(0.72)	(0.74)	(0.01)	(0.06)	(0.57)						
(32)	0.05	0.09	0.04	0.06	0.10	-0.06	-0.05	-0.05	-0.03	-0.02	-0.15	0.03	0.04	-0.02	0.01	0.06	0.08	0.02	1.00				
	(0.43)	(0.16)	(0.51)	(0.40)	(0.14)	(0.36)	(0.47)	(0.40)	(0.69)	(0.73)	(0.02)	(0.62)	(0.55)	(0.74)	(0.93)	(0.33)	(0.22)	(0.77)					
(33)	0.06	0.22	0.05	0.09	0.20	0.23	0.05	-0.02	0.01	0.11	0.02	-0.14	0.16	0.16	-0.01	-0.16	0.14	0.04	-0.08	1.00			
	(0.36)	(0.00)	(0.42)	(0.16)	(0.00)	(0.00)	(0.48)	(0.72)	(0.91)	(0.08)	(0.77)	(0.04)	(0.01)	(0.02)	(0.88)	(0.01)	(0.03)	(0.57)	(0.21)				
(34)	0.13	0.25	0.17	0.21	0.20	0.10	0.03	-0.04	0.08	-0.01	-0.18	0.00	0.03	-0.03	0.00	0.03	0.01	0.01	0.13	0.07	1.00		
	(0.04)	(0.00)	(0.01)	(0.00)	(0.00)	(0.14)	(0.70)	(0.57)	(0.23)	(0.85)	(0.01)	(0.96)	(0.59)	(0.62)	(0.96)	(0.64)	(0.93)	(0.90)	(0.05)	(0.32)			
(35)	0.08	0.09	0.14	0.10	0.12	0.01	0.02	-0.01	0.03	0.08	-0.02	0.01	-0.07	-0.03	0.03	0.10	-0.01	-0.05	0.03	-0.12	0.00	1.00	
	(0.21)	(0.19)	(0.03)	(0.11)	(0.07)	(0.85)	(0.70)	(0.84)	(0.65)	(0.20)	(0.74)	(0.94)	(0.30)	(0.69)	(0.62)	(0.12)	(0.89)	(0.49)	(0.62)	(0.06)	(0.95)		

## RESULTS

In Tables 1 and 2, we report descriptive statistics and correlations for all the variables used in the analyses (p-values in parentheses). In the Tables, the first eight are the variables used to identify TMT organizational configurations, then variables related to opportunity exploitation are shown, and finally control variables are presented. In the following, we provide the results obtained performing the above-cited analyses.

## Cluster analysis: identifying TMT organizational configurations

Cluster analysis provides support for the presence of three well-characterized clusters. The following Table 3 shows the cluster mean for each of the eight variables considered in the analysis<sup>3</sup>. Moreover, the Table also reports the mean on the overall sample and the p-value of the one-way analysis of variance (ANOVA) tests. Basing on these tests, we found all the variables are statistically different among clusters at 99%. Taking inspiration from Gruber et al. (2010) and basing on the results of the Scheffe post-hoc tests, for each variable we indicated among which clusters there are not statistically significant differences. Specifically, the same superscript label means that the variable is not distributed in different ways in the clusters in correspondence of which the same label is reported. Moreover, the highest mean is labeled with 'a', the next highest mean with 'b', and the lowest mean with 'c'. Table 4 reports a verbal description of the clusters<sup>4</sup>.

To facilitate the description of the three clusters we assigned a name to each TMT organizational configuration: *CEO centric TMT*, *integrated TMT*, and *incentive based TMT*. As anticipated, in order to include TMT organizational configuration in the following regression and SURE models, we created three dummy variables, one for each configuration.

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<sup>3</sup> Note that, as aforementioned, we standardized all the variables to perform the two-step cluster analysis. However, in Table 3 we decided to report non-standardized values to make results easier to read. The only exceptions are *formal coordination*, *tacit coordination* and *ongoing communication* variables as they have been computed applying a PCA.

<sup>4</sup> Here three examples are provided to interpret Table 3 and 4:

- (i) In the case of *TMT delegation*, two separate brackets emerge: the first one, with the superscript 'a', includes cluster 2 and 3, meaning that there are not statistical differences between these two clusters. The second bracket coincides with cluster 1, identified with the superscript 'b', meaning that it is statistically different from cluster 2 and 3. Consequently, in Table 4, which translates the superscript with verbal brackets names, cluster 2 and 3 are labeled as *high*, while cluster 1 falls in the *low* bracket.
- (ii) Considering *TMT size*, there are three statistically different brackets: *high*, *medium*, and *low* (see Table 4). In each of them falls a specific cluster, characterized by a specific subscript label: 'a' (*high* bracket), 'b' (*medium* bracket), and 'c' (*low* bracket).
- (iii) Lastly, as *TMT delegation*, *TMT formalization* is characterized by two brackets. However, in this case there are not statistically differences between cluster 1 and 3, and cluster 2 and 3, while cluster 1 and 2 are statistically different. Consequently, being cluster 3 not different from neither cluster 1 nor cluster 2, its superscript label includes both 'a' (specific of cluster 2) and 'b' (representative of cluster 1). For the same reason, in Table 4, it is labeled as *low/high*, where *low* is the bracket of cluster 1, while *high* the one of cluster 2. Note that this case is different from the previous one in which the intermediate cluster is statistically different from the remaining two, so being labeled as *medium*.

**Table 3.** Cluster analysis' results

Variables	Sample mean	1	2	3	ANOVA p-value
		(n = 80) <i>CEO centric TMT</i>	(n = 80) <i>Integrated TMT</i>	(n = 77) <i>Incentive based TMT</i>	
TMT delegation	2.6909	2.4951 <sup>b</sup>	2.7935 <sup>a</sup>	2.7877 <sup>a</sup>	0.0000
TMT variable compensation	2.6878	2.2250 <sup>b</sup>	2.0750 <sup>b</sup>	3.8052 <sup>a</sup>	0.0000
CEO variable compensation	2.9156	2.3500 <sup>b</sup>	1.8875 <sup>c</sup>	4.5714 <sup>a</sup>	0.0000
Formal coordination	0.0090	-0.8279 <sup>b</sup>	0.5373 <sup>a</sup>	0.3298 <sup>a</sup>	0.0000
Tacit coordination	-0.0049	-0.8617 <sup>c</sup>	0.5742 <sup>a</sup>	0.2837 <sup>b</sup>	0.0000
Ongoing communication	0.0127	-0.7551 <sup>c</sup>	0.7354 <sup>a</sup>	0.0596 <sup>b</sup>	0.0000
TMT size	6.4231	4.4762 <sup>c</sup>	6.7228 <sup>b</sup>	8.1343 <sup>a</sup>	0.0000
TMT formalization	3.8797	3.5438 <sup>b</sup>	4.2250 <sup>a</sup>	3.8701 <sup>a,b</sup>	0.0059

In the table, cluster means are reported. In each row, if cluster means have the same superscript label then there are not statistically differences among them basing on the Sheffe post-hoc test. The superscript 'a' represents the highest value, 'b' the next highest value, and 'c' the lowest value. For an example of interpretation of Table 3 and 4, see Footnote 4.

**Table 4.** Verbal cluster description

Variables	1	2	3
	<i>CEO centric TMT</i>	<i>Integrated TMT</i>	<i>Incentive based TMT</i>
TMT delegation	Low	High	High
TMT variable compensation	Low	Low	High
CEO variable compensation	Medium	Low	High
Formal coordination	Low	High	High
Tacit coordination	Low	High	Medium
Ongoing communication	Low	High	Medium
TMT size	Small	Medium	Large
TMT formalization	Low	High	Low, High

Two brackets: high, low.

Three brackets: high, medium, low.

Clusters belong to two brackets in case cluster means are not statistically different.

In the following, a brief description of the three TMT organizational configurations is provided.

*Organizational configuration 1: "CEO centric TMT".* TMTs adopting this organizational configuration are characterized by the lowest level of delegation; thus, we called the cluster *CEO centric TMT*, meaning that decisions are made mainly by the CEO and are not delegated downward the hierarchy. This delegation level pairs with a low level of TMT coordination, both formal and informal, and TMT communication, probably because, due to scarce delegation, TMT members do not need to coordinate and communicate each other to exchange information and make decisions. Moreover, *CEO centric TMTs* are smaller (5 executives on average) and lower formalized. Finally, considering the three clusters, the variable compensation settles at an intermediate level for the CEO and at the lowest level for the TMT on average, meaning that incentives are not used to align TMT members' objectives.

*Organizational configuration 2: "Integrated TMT"*. Considering this configuration, TMTs are characterized by a high level of delegation. However, incentives are not used to align the objectives of the members, as testified by the lowest level of variable compensation, considering both the CEO and the TMT on average. On the contrary, high delegation pairs with the highest use of coordination and communication mechanisms, testifying an effort in developing an *integrated TMT*. In addition, also the use of formalization is high, while the size of the TMT is intermediate between the other two clusters (7 managers on average).

*Organizational configuration 3: "Incentive based TMT"*. Contrary to *CEO centric TMTs*, these teams, as the previous one, show a high level of delegation and use of formal coordination mechanisms. In other words, compared to the previous one these TMTs have the same level of delegation of decision authority, but they differ in the instruments used to control the TMT and take advantage of this high delegation. Specifically, the use of informal coordination mechanisms and ongoing communication is lower, while incentives result as the main instrument used to align TMT members' objectives and facilitate the decision making. Indeed, CEO and TMT variable compensation are higher than in the other two clusters. Moreover, these TMTs are the biggest (8 members on average) and because the high use of incentives distinguishes these TMTs from those in the other two clusters, we called this configuration *incentive based TMT*.

### Opportunity exploitation and TMT configurations: a first look at differences and similarities

Once identified organizational configurations, we performed a series of Scheffe post hoc tests to assess whether the mean of the number of opportunities exploited and the exploitation of the seven aforementioned opportunities is different among clusters; Table 5 provides results. Overall, opportunity exploitation is distributed differently among the three TMT organizational configurations, with a level of significance of 99%. However, comparing pairs of clusters, we found significant differences only between *CEO centric TMT* and *incentive based TMT*, and between *CEO centric TMT* and *integrated TMT* (99% of significance in both cases).

Considering specific types of opportunities, the lowest level of exploitation is always associated with the *CEO centric TMT*, except for new ways of managing accounting and finance that is low also for *incentive based TMT*. *Integrated TMTs* and *incentive based TMTs* highly exploit opportunities, with no statistical differences among them (95% of significance). The only exception are new production technology opportunities, for which there are no statistical differences between cluster 2 and 3, but also between cluster 3 and 1, and new markets opportunities, for

which there are no statistical differences between cluster 2 and 3, and cluster 2 and 1. To sum up, a first signal of the presence of differences in opportunity exploitation emerges, with more opportunities exploited by firms with TMTs characterized by high delegation, coordination, communication, use of incentives, and formalization.

**Table 5.** Opportunity exploitation and clusters

Variable	Sample mean	1 <i>CEO centric TMT</i>	2 <i>Integrated TMT</i>	3 <i>Incentive based TMT</i>	ANOVA p-value
Opportunity exploitation	4.1031	3.5714 <sup>b</sup>	4.3946 <sup>a</sup>	4.3525 <sup>a</sup>	0.0000
New products and services	4.3713	3.8750 <sup>b</sup>	4.5250 <sup>a</sup>	4.7273 <sup>a</sup>	0.0057
New production technologies	4.0253	3.5250 <sup>b</sup>	4.4125 <sup>a</sup>	4.1429 <sup>a,b</sup>	0.0069
New markets	4.3671	3.8750 <sup>b</sup>	4.4125 <sup>a,b</sup>	4.8312 <sup>a</sup>	0.0081
Changes in the organization (structure and work)	4.5527	3.8000 <sup>b</sup>	4.8500 <sup>a</sup>	5.0260 <sup>a</sup>	0.0000
New ways to manage HR	4.1097	3.4250 <sup>b</sup>	4.4250 <sup>a</sup>	4.4935 <sup>a</sup>	0.0000
New ways to manage R&D	3.6793	3.1375 <sup>b</sup>	4.0375 <sup>a</sup>	3.8701 <sup>a</sup>	0.0037
New ways to manage Accounting & Finance	3.6160	3.3625 <sup>b</sup>	4.1000 <sup>a</sup>	3.3766 <sup>b</sup>	0.0133

In the table, cluster means are reported. In each row, if cluster means have the same superscript label than there are not statistically differences among them, basing on the Sheffe post-hoc test. The superscript 'a' represents the highest value, 'b' the next highest value, and 'c' the lowest value. For an example of interpretation of Table 5 and 6, see Footnote 4.

**Table 6.** Verbal description of opportunity exploitation among clusters

Variable	1 <i>CEO centric TMT</i>	2 <i>Integrated TMT</i>	3 <i>Incentive based TMT</i>
Opportunity exploitation	Low	High	High
New products and services	Low	High	High
New production technologies	Low	High	Low/High
New markets	Low	Low/High	High
Changes in the organization (structure and work)	Low	High	High
New ways to manage HR	Low	High	High
New ways to manage R&D	Low	High	High
New ways to manage Accounting & Finance	Low	High	Low

Two brackets: high, low.

Three brackets: high, medium, low.

Clusters belong to two brackets in case cluster means are not statistically different.

Moreover, looking at Table 6 this first analysis of opportunity exploitation among clusters reveals that two configurations are equi-final basing on opportunity exploitation in general, and on some specific types of opportunities. In details, *integrated TMTs* and *incentive based TMTs* lead to the same level of exploitation of opportunities related to new products and services, changes in the organization, and new ways to manage HR and R&D. However, it is worth mentioning that also *CEO centric TMTs* and *integrated TMTs* seem to lead to the same results in term of new ways to manage accounting and finance.



Basing on these preliminary results, we further investigated the relation between TMT organizational configurations and opportunity exploitation using the models presented in the following section, which also helped to better understand the presence of equi-finality between the two TMT organizational configurations characterized by the highest level of delegation.

### Going deeper in the relation: does TMT organization matter in exploiting opportunities?

As anticipated, to understand the relation between opportunity exploitation and the TMT organizational configuration adopted by the firm we run four different models, which take also into account some control variables that may affect opportunity exploitation. Moreover, these models were useful to comprehend whether different TMT configurations are equi-final in favoring or preventing the exploitation of opportunities.

The dependent variables were opportunity exploitation in general for Models 1 and 2 (see Table 7), and the two specific types of opportunities for Models 3 and 4, meaning *change opportunities* and *innovation opportunities*. All four models included controls for the characteristics of the CEO: CEO's tenure and gender, whether the CEO holds a degree and an MBA, and the amount of her decision authority. Other controls referred to firm's size and age, industry, geographical location, governance (i.e., whether the firm is a family owned and managed firm or whether it is a subsidiary of a national or a foreign firm), the type of organizational structure adopted by the firm, the number of hierarchical levels, and the adoption of an ERP system. To these variables, we added the level of competition faced by the firm, the rapidity of change of the market, and the growth of the firm. Finally, about the independent variables, we included TMT organizational configuration dummy variables. Specifically, we added the two TMT configurations that appeared to be equi-final in the preliminary Sheffe post-hoc analysis described above: *integrated TMT*, equal to 1 if the TMT adopted this kind of configuration, and *incentive based TMT*, equal to 1 if the TMT followed this organizational configuration. Independent variables were included in Models 2 and 4, while in Models 1 and 3 only control variables were considered. In the following Table 7, results of OLS and SURE models are shown. Coefficient estimates and significance level are reported (standard errors in parentheses).

**Table 7.** OLS and SURE models on opportunity exploitation (in general and specific)

	Model 1		Model 2		Model 3				Model 4			
	Opportunity exploitation		Opportunity exploitation		Change opportunities		Innovation opportunities		Change opportunities		Innovation opportunities	
	coef.	p-value	coef.	p-value	coef.	p-value	coef.	p-value	coef.	p-value	coef.	p-value
<i>Integrated TMT</i>	-		0.4696	0.0014	-		-		0.4280	0.0034	0.2405	0.0886
			(0.1452)						(0.1462)		(0.1413)	
<i>Incentive based TMT</i>	-		0.4568	0.0069	-		-		0.2674	0.1122	0.3496	0.0317
			(0.1673)						(0.1684)		(0.1627)	
Firm size (employees 2013)	0.0880	0.0749	0.0584	0.2471	0.1144	0.0200	0.0119	0.8001	0.1026	0.0428	-0.0149	0.7603
	(0.0492)		(0.0503)		(0.0492)		(0.0472)		(0.0507)		(0.0490)	
Hierarchical levels	-0.0037	0.9456	-0.0110	0.8362	0.0369	0.4957	-0.0305	0.5577	0.0254	0.6355	-0.0305	0.5561
	(0.0542)		(0.0533)		(0.0542)		(0.0520)		(0.0536)		(0.0518)	
Divisional structure	0.0358	0.8546	-0.0576	0.7647	-0.1278	0.5122	0.1361	0.4672	-0.2009	0.2990	0.0789	0.6729
	(0.1950)		(0.1922)		(0.1950)		(0.1872)		(0.1935)		(0.1870)	
Hybrid structure	-0.0368	0.7961	-0.0574	0.6802	-0.2043	0.1511	0.1423	0.2975	-0.2203	0.1154	0.1296	0.3380
	(0.1423)		(0.1390)		(0.1423)		(0.1366)		(0.1399)		(0.1353)	
Matrix structure	0.3713	0.0511	0.2977	0.1122	0.0367	0.8462	0.4598	0.0114	-0.0080	0.9662	0.4047	0.0258
	(0.1893)		(0.1866)		(0.1893)		(0.1817)		(0.1878)		(0.1815)	
Firm age	-0.0144	0.8746	-0.0307	0.7310	0.0993	0.2763	-0.1393	0.1118	0.0862	0.3366	-0.1490	0.0859
	(0.0912)		(0.0892)		(0.0912)		(0.0876)		(0.0897)		(0.0867)	
Family owned and managed	-0.2431	0.0987	-0.1975	0.1782	-0.2147	0.1430	-0.1440	0.3061	-0.2035	0.1666	-0.0971	0.4946
	(0.1466)		(0.1462)		(0.1466)		(0.1407)		(0.1471)		(0.1422)	
Subsidiary	0.0782	0.5730	0.0595	0.6619	0.0068	0.9607	0.0739	0.5785	0.0021	0.9876	0.0547	0.6789
	(0.1385)		(0.1358)		(0.1386)		(0.1330)		(0.1367)		(0.1321)	
Subsidiary of a foreign firm	-0.5588	0.0033	-0.5793	0.0020	-0.2893	0.1242	-0.5405	0.0028	-0.2861	0.1242	-0.5680	0.0016
	(0.1881)		(0.1849)		(0.1882)		(0.1806)		(0.1861)		(0.1799)	
CEO gender	-0.0697	0.7405	-0.0110	0.9576	-0.0693	0.7417	-0.0105	0.9587	-0.0106	0.9593	0.0156	0.9381
	(0.2101)		(0.2062)		(0.2102)		(0.2018)		(0.2075)		(0.2006)	
CEO tenure	-0.0676	0.2493	-0.0610	0.2871	-0.1494	0.0107	0.0475	0.3971	-0.1457	0.0113	0.0527	0.3433
	(0.0585)		(0.0571)		(0.0585)		(0.0561)		(0.0575)		(0.0556)	
CEO degree	0.0423	0.7640	0.0689	0.6215	-0.1799	0.2009	0.2167	0.1085	-0.1381	0.3244	0.2167	0.1096
	(0.1406)		(0.1393)		(0.1407)		(0.1350)		(0.1401)		(0.1355)	
CEO decision power	0.3324	0.0520	0.2222	0.1906	0.1052	0.5362	0.3401	0.0373	0.0245	0.8858	0.2684	0.1029
	(0.1701)		(0.1692)		(0.1701)		(0.1633)		(0.1703)		(0.1646)	
Firm growth	0.2211	0.5368	0.1943	0.5784	0.3127	0.3818	-0.0065	0.9850	0.2855	0.4163	-0.0181	0.9575
	(0.3574)		(0.3491)		(0.3575)		(0.3431)		(0.3513)		(0.3396)	
ERP system	0.4284	0.0029	0.3603	0.0110	0.2151	0.1300	0.3608	0.0081	0.1517	0.2828	0.3269	0.0166
	(0.1420)		(0.1403)		(0.1421)		(0.1364)		(0.1412)		(0.1365)	
Market competition	0.2956	0.0000	0.2678	0.0000	0.1771	0.0032	0.2381	0.0000	0.1501	0.0120	0.2252	0.0001
	(0.0600)		(0.0594)		(0.0601)		(0.0577)		(0.0598)		(0.0578)	
Market evolution	0.1535	0.0157	0.1430	0.0226	0.1378	0.0287	0.0841	0.1644	0.1208	0.0539	0.0846	0.1626
	(0.0630)		(0.0623)		(0.0630)		(0.0605)		(0.0627)		(0.0606)	
Industry dummies	YES		YES		YES		YES		YES		YES	
Geographical area dummies	YES		YES		YES		YES		YES		YES	
Intercept	-1.7219	0.0310	-1.5063	0.0544	-1.1554	0.1453	-1.2399	0.1034	-1.0328	0.1875	-1.0721	0.1569
	(0.7931)		(0.7786)		(0.7933)		(0.7614)		(0.7835)		(0.7574)	
N	237		237		237		237		237		237	
Log likelihood	-285.8959		-279.0790		-591.2596		-591.2596		-583.9181		-583.9181	
R <sup>2</sup>	0.2635		0.2979		0.2452		0.3200		0.2717		0.3346	

Standard errors in parentheses.

Observing Table 7, we can affirm that the TMT organizational configuration matters in exploiting opportunities. Indeed, Model 2 shows that *integrated TMTs* and *incentive based TMTs* have a positive and significant relation with opportunity exploitation in general. Consequently, we can suppose that delegating decision authority to the TMT members favors opportunity exploitation, maybe because the autonomy and trust provided induce them to identify and

propose a higher amount of opportunities, so increasing the number of those that can be subsequently exploited. However, the effect is more significant for the first configuration (with also a higher coefficient). This means that organizing the TMT relying on the use of informal coordination mechanisms rather than incentives better favor the exploitation of opportunities.

A similar result is found analyzing the exploitation of opportunities related to change opportunities (i.e., changes in the organization (structure and work), and new ways to manage HR and accounting and finance). Model 4 testifies that, in case of this specific type of opportunities, only the *integrated TMT* configuration matter, with a positive and significant effect at 99%. On the contrary, we do not find any significant effect of being organized basing on incentives. Model 4 also provides information about the exploitation of innovation opportunities (i.e., new products and services, new production technologies, entry into new markets, and new ways to manage R&D). In this case, as for opportunity exploitation in general, both TMT organizational configurations matter, with a positive and significant effect.

Following these considerations, we can affirm that, consistently with the preliminary analysis based on Sheffe post-hoc tests (see Table 5 and 6), there is equi-finality between *integrated TMT* and *incentive based TMT* configurations when considering opportunity exploitation in general and innovation opportunities in specific. On the contrary, only the *integrated TMT* configuration has a significant effect on change opportunities.

Observing control variables, it appears that only few aspects are relevant for opportunity exploitation and not for all the types of opportunities. First, *firm size* does not matter for innovation opportunities, while it is relevant for the other types of opportunity. Moreover, this still holds when including configurations in the model only in case of change opportunities, meaning that, independently from the type of TMT configuration adopted, the bigger is the firm, the higher is the number of change opportunities exploited by the firm. A similar effect is found for the adoption of the *matrix* organizational structure. However, in this case, being organized as a matrix positively relates to opportunity exploitation in general (only in case we do not consider configurations) and on innovation opportunities. Independently from the adopted TMT configuration, being organized as a matrix helps in exploiting a higher number of innovation opportunities. This can be explained by the fact that adopting the matrix organizational structure means to be more focused on products' and markets' needs, consequently, thanks to this specific focus, it is reasonable to think that a higher number of opportunities related to processes, products and markets can be exploited (i.e., innovation opportunities); other types of structures

do not matter in opportunity exploitation. Innovation opportunities are also negatively related to the age of the firm, meaning that the more the firm is old, the more it is stable and inert, and the more it is difficult for it to change its processes, products and markets. In addition, also being a subsidiary of a foreign firm negatively relates to opportunity exploitation, both in general and specific.

Second, for what concern the characteristics of the CEO, only *CEO tenure* and *CEO decision power* are associated with opportunity exploitation. In particular, the longer is the tenure of the CEO, the lower is the exploitation of change opportunities, meaning that a person who is in charge of leading a firm since a high number of years will be more inert and less willing to change its organization. Contrarily, a different effect is found for *CEO decision power*, which is positively related with opportunity exploitation in general and change opportunities; however, this results holds only in case we do not include TMT configurations in the models.

Lastly, innovation opportunities are also related to the adoption of an *ERP system*, which is also positively associated with opportunity exploitation in general. Change opportunities are instead positively related with the increase in the *market competition* and rapidity of *evolution*, which are also related in a positive way with opportunities in general.

### Robustness check

To test the robustness of our findings, we performed some additional analyses. Results are available from the authors upon request.

First, we checked our TMT organizational configurations using an alternative measure of *TMT delegation*. Indeed, the measure we considered (see the *research methodology* section) includes also the cases in which the lowest level to which the decision authority is delegated is the one of the middle managers, which is below the TMT. Consequently, one can argue that this measure is not in line with the purposes of our study, which aims at focusing on the configurations of the TMT. For this reason, we checked whether the configurations we found and the following results on opportunity exploitation have been influenced by the way in which we measured this organizational design element. Specifically, we run estimates excluding the middle managers level in computing *TMT delegation*. In so doing, the results remained unchanged. Indeed, we obtained three TMT configurations with the same characteristics of those described earlier up and the results confirmed the positive relation between TMT configurations and opportunity exploitation,

both in general and considering the two specific types of opportunities. We can thus conclude that the way in which we measured *TMT delegation* did not affect results.

Second, the results provided in the previous section show how the two TMT configurations (integrated TMT and incentive based TMT) are positively related to the amount of opportunities exploited by the firm, both in general and considering the two kinds of opportunities (with change opportunities being significantly associated with only the integrated TMT). In these analyses, opportunity exploitation was measured as a continuous variable representing the amount of opportunities successfully exploited by the firm during the last three years. Thus, we checked whether our results depend on the way in which the variable was measured and on the timing of opportunity exploitation and of the adoption of the TMT configuration. About the former, we repeated estimates measuring opportunity exploitation as a dummy variable that equals 1 in case the amount of exploited opportunities is high. We considered as a threshold the median of the continuous variables considered in the main analyses; we choose this specific threshold because it allows a good distribution of the sample between high and low opportunity exploitation, while considering higher percentiles would have brought to unbalanced samples that might have affected estimates. We thus created three dummy variables corresponding to opportunity exploitation on average, change opportunities, and innovation opportunities. Then, we repeated estimates using *probit* and *seemingly unrelated bivariate probit regression* models, due to the nature of the new dependent variables. Also in this case we obtained results consistently in line with those presented earlier. In particular, results were the same for opportunity exploitation in general and innovation opportunities, while change opportunities were not only positively related to the integrated TMT, but, differently from previous results, also to the incentive based TMT (p-value = 0.084). Then, we checked whether results were influenced by the time effect. Specifically, having a cross-sectional database, we are not able to control whether it is the TMT configuration which influences the amount of opportunities exploited or whether they are the exploited opportunities that influence the TMT configuration. To control for this, because the variable representing opportunity exploitation measure it considering the last three years, we decided to run estimates considering only those CEOs whose tenure is equal to or higher than five years. Indeed, firms are known to be inert to changes and we posit that it is the same for TMTs and their configurations. Assuming that the TMT configuration is designed by the CEO, considering only those with a tenure equal to or higher than 5 years allows us to control whether it is the TMT configuration, defined at least 5 years ago, that influences the amount of opportunities exploited

during the last three years. Results of these analyses were fully in line with those presented earlier up, both in sign and in significance level. If our assumption of the TMT configurations' inertia was true, we could affirm that it is the TMT configuration that affects the amount of opportunities exploited.

Third, we included in the four models some additional confounding factors, which may be related to the amount of opportunities exploited. First, we considered two characteristics of the TMT, which may affect the amount of opportunities identified and then exploited by the firm. These are the average tenure of the TMT members (*TMT tenure*) and the female representation in the TMT (*TMT female representation*), measured as the percentage of women in the TMT. Second, we took into account a proxy of the strategic orientation of the firm, which may be positively related to opportunity exploitation and which is measured by the ratio between firm's foreign sales and total sales. In addition to this, we introduced two variables measuring the expenses that can be related to the two kind of opportunities, namely *HR training expenses* for changes opportunities and *R&D expenditures* for innovation opportunities. However, due to the high number of missing values we had in correspondence to these five variables, including all of them in the models would have reduced the sample size to only 119 observations, thus affecting results. Consequently, we decided to introduce in the models first the variables about the TMT, and then, in a second moment, those related to firm's characteristics. In so doing, in both cases results were consistently in line with those presented above. Specifically, we obtained the same results for opportunity exploitation in general and for change opportunities. Differently, innovation opportunities appeared to be positively and significantly related only to the integrated TMT, while the positive sign of the incentive base TMT was maintained but it was not significant. However, this result might be driven by the reduced sample size, which is equal to 160 in case we introduced the additional controls related to the TMT and to 164 when we introduced additional firm's characteristics.

Lastly, we checked for the presence of endogeneity. Indeed, the choice of the TMT configuration by the CEO is not random and may be influence by her characteristics. Moreover, there might be some unobserved factors simultaneously affecting TMT configuration and opportunity exploitation or simultaneous causality between them, which would bring to inconsistent results and biased estimations. To test for the presence of endogeneity, we resorted to an instrumental variables (IVs) approach adopting a two-stage model. Due to the difficulties in finding instruments for the integrated TMT and the incentive based TMT, which are quite similar

configurations, we decided to find instrumental variables for the CEO centric TMT. Specifically, we defined three instruments that represent some trait of her personality that may explain her decision to adopt a CEO centric configuration. The first variable (*CEO sense of superiority*) represents how much the CEO believes or other people induce her to believe to be a special person in her every-day life. Believing to be a special person may lead the CEO thinking to be better than her TMT managers and thus she would tend to retain the decision authority and organize her TMT as a CEO centric one. The second instrumental variable indicates the extent to which the CEO has an exhibitionist behavior (*CEO exhibitionist behavior*), meaning that she likes to be the center of attention of many people in her every-day life. In this case, the more the CEO possesses an exhibitionist trait, the less she is likely to create a small, CEO centric TMT. Instead, she is likely to prefer to be surrounded by a greater number of managers (thus adopting an integrated or incentive-based TMT, which are medium and large TMTs respectively). Lastly, the third instrumental variable measures *CEO sense of being respected*, meaning the feeling of the CEO of being respected by other people in her every-day life. In this case, a CEO who is used to feel respected from others is more likely to create social relations and to be more integrated with them. Consequently, she would be more likely to organize her TMT has an integrated TMT or an incentive based TMT, in which she can interact with other managers, who likely respect her. On the contrary, in case she does not feel respected by other people, she is more likely to isolate in her every-day life and, leading her firm, she would be more likely to lead a CEO centric TMT, allowing her to interact with the lowest number of TMT managers as possible. Moreover, in this way she can show up herself and what she is capable of in order to induce other people to respect her more. We chose these instruments, not only for their relation with TMT configurations, but also because we think that there are no reasons why they could influence the amount of opportunities exploited by the firm. Instruments are therefore relevant. We measured *CEO sense of superiority*, *CEO exhibitionist behavior*, and *CEO sense of being respected* administering the Narcissistic Personality Inventory (NPI, Raskin and Hall, 1981) to the 241 CEOs who took part in the survey. Once the survey concluded, we obtained 202 answers (83.82% response rate). We computed the *CEO sense of superiority* considering the following dummy variable (1 if yes, 0 otherwise): (i) “I know that I am good because everybody keeps telling me so”. *CEO exhibitionist behavior* was represented by the NPI item “I like to be the center of attention”, basing on which we created another dummy variable (1 if yes, = otherwise), while we measured *CEO sense of being respected* using a dummy variable corresponding to the following NPI item: “I usually get the respect that I deserve” (1 if yes, 0 otherwise).

Prior to perform the IVs analysis, we run again the main model on opportunity exploitation considering as independent variable the CEO centric TMT dummy (and not the other two configurations as in previous Models 1 and 2); in so doing, we obtained results to compare with those of the IVs analysis. Then, we run the two-stage model. In the first stage, the CEO choose to adopt a CEO centric TMT configuration basing on her sense of superiority and sense of being respected; in this stage, we used a *probit* model due to the dichotomous nature of the dependent variable (i.e., *CEO centric TMT*). Then, in the second step, we inserted the predicted probability of CEO centric TMT's adoption (*CEO centric TMT predicted*), using an OLS model (Stata command: *ivtreatreg (probit-OLS)*, Cerulli (2014)). Results are consistent with the main estimation. However, once we run the two-stage model, we conducted the Hausman endogeneity test (e.g., Wooldridge, 2002) for the CEO centric TMT and it test did not produce a significant result ( $\chi^2(1) = 0.268$ , p-value = 0.6044), meaning that our configuration variable is not endogenous in the opportunity exploitation model (the results of the instrumental variables estimates are reported in the Appendix).

## CONCLUSIONS

In this paper, we studied whether the organization of the TMT is associated with the level of opportunity exploitation of the firm. Specifically, first, we adopted a configurational approach, identifying different TMT organizational configurations as the combination of different organizational elements (i.e., TMT delegation, TMT incentives, TMT coordination, TMT communication, TMT size, and TMT formalization). Second, we found that these configurations are differently associated with opportunity exploitation, considering both opportunities in general and two specific types of opportunities (i.e., change opportunities and innovation opportunities). In particular, we demonstrated that when the TMT is organized basing on an integrated TMT or an incentive based TMT configuration, firms' exploit a higher number of opportunities. These two configurations are indeed equi-final in the association with opportunity exploitation in general and innovation opportunities. Differently, only the integrated TMT configuration is associated with change opportunities. Results are confirmed by the robustness checks we performed.

With our work, we filled the existing gap in the opportunity exploitation literature. Indeed, until now this literature has disregarded the role of the organizational elements, with the only exceptions of Foss and colleagues (2013, 2015). Moreover, these elements have been studied in isolation and at the general firm level, without taking into account the role of the TMT. However, we contribute, not only to the opportunity exploitation literature, but also to the literature on the



TMT, showing that the organizational elements cluster in different configurations that are associated with opportunity exploitation, and to the organizational configuration literature, identifying configurations at the TMT level, which has been disregarded by this stream of literature.

Our work also has some managerial implications. Indeed, we advise CEOs on how to organize their TMT to exploit opportunities, as TMT organization is easier to change compared to firm's overall organization and it is directly manageable by the CEO. First, they had to consider the interplay that exists among the main TMT organizational design elements. Second, being integrated TMT and incentive based TMT equi-final means that there are different ways of organizing the TMT that are associated with the same result in terms of opportunity exploitation. This makes it easier for CEOs to align their TMT, allowing them to minimize the changes to implement (i.e., basing on the actual characteristics of the TMT, the CEO can choose to change its organization towards the closest configuration).

In interpreting results, limitations have to be kept in mind. First, despite we deeply motivated them, we focus on some specific organizational elements. It might be that other factors matter in exploiting opportunities (e.g., behavioral elements). Second, despite we performed several robustness checks, there might be other confounding factors affecting results. Third, our database focuses on a single country, which is Italy. Consequently, a problem of generalizability of the results emerges. These limitations give rise to directions for further research and we hope our work will be of inspiration for researchers to go deeper in the study of how the characteristics and organization of the TMT influence opportunity exploitation. For instance, it would be interesting to study whether this relation depends on CEO's individual traits. At the same time, it would be intriguing to understand what are the boundary conditions for this relation, searching for some moderating factors (e.g., the level of trust within the TMT). Lastly, it would be relevant to study how TMT configurations affect performance.

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## APPENDIX

**Table 8.** Instrumental variables estimates

	Model 5		Model 6		Model 7		Model 8	
	Opportunity exploitation coef.	p-value	Opportunity exploitation coef.	p-value	CEO centric TMT coef.	p-value	Opportunity exploitation coef.	p-value
CEO centric TMT	-		-0.3912 (0.1509)	0.0103	-		-	
CEO centric TMT - predicted	-		-		-		-0.8809 (0.4401)	0.0469
CEO sense of superiority	-		-		0.7000 (0.2756)	0.0110	-	
CEO exhibitionist behavior	-		-		-0.5099 (0.2657)	0.0550	-	
CEO sense of being respected	-		-		-0.7053 (0.4267)	0.0980	-	
Firm size (employees 2013)	0.1262 (0.0568)	0.0275	0.0946 (0.0571)	0.0998	-0.3613 (0.1154)	0.0020	0.0565 (0.0666)	0.3973
Hierarchical levels	-0.0435 (0.0626)	0.4875	-0.0492 (0.0616)	0.4252	-0.0086 (0.1120)	0.9390	-0.0565 (0.0601)	0.3479
Divisional structure	0.0592 (0.2132)	0.7817	-0.0284 (0.2124)	0.8939	-0.8751 (0.4214)	0.0380	-0.1309 (0.2159)	0.5451
Hybrid structure	-0.0755 (0.1623)	0.6425	-0.0796 (0.1596)	0.6186	0.0341 (0.2848)	0.9050	-0.0916 (0.1520)	0.5475
Matrix structure	0.4738 (0.2157)	0.0294	0.3966 (0.2142)	0.0658	-0.7896 (0.4563)	0.0840	0.2901 (0.2394)	0.2273
Firm age	-0.0484 (0.1089)	0.6569	-0.0513 (0.1071)	0.6325	0.0648 (0.1968)	0.7420	-0.0552 (0.1009)	0.5853
Family owned and managed	-0.2707 (0.1714)	0.1162	-0.2443 (0.1689)	0.1499	0.3609 (0.2894)	0.2120	-0.2082 (0.1698)	0.2217
Subsidiary	0.0720 (0.1692)	0.6709	0.0586 (0.1665)	0.7253	0.0753 (0.3244)	0.8170	0.0495 (0.1711)	0.7726
Subsidiary of a foreign firm	-0.5165 (0.2089)	0.0144	-0.5193 (0.2055)	0.0124	0.0360 (0.3958)	0.9280	-0.5253 (0.1996)	0.0093
CEO gender	-0.0403 (0.2468)	0.8706	0.0222 (0.2439)	0.9276	0.8088 (0.4083)	0.0480	0.1008 (0.2164)	0.6419
CEO tenure	-0.0931 (0.0685)	0.1756	-0.0882 (0.0674)	0.1921	0.1589 (0.1222)	0.1940	-0.0821 (0.0642)	0.2031
CEO degree	0.0641 (0.1574)	0.6844	0.0761 (0.1549)	0.6241	0.0935 (0.2710)	0.7300	0.0928 (0.1560)	0.5529
CEO decision power	0.3162 (0.1858)	0.0906	0.2308 (0.1857)	0.2156	-1.1473 (0.4045)	0.0050	0.1156 (0.1846)	0.5320
Firm growth	0.1893 (0.3896)	0.6277	0.1720 (0.3832)	0.6541	0.2303 (0.7006)	0.7420	0.1337 (0.4013)	0.7394
ERP system	0.3754 (0.1575)	0.0182	0.3213 (0.1563)	0.0413	-0.5752 (0.2728)	0.0350	0.2606 (0.1603)	0.1059
Market competition	0.2728 (0.0720)	0.0002	0.2472 (0.0715)	0.0007	-0.2647 (0.1333)	0.0470	0.2123 (0.0760)	0.0059
Market evolution	0.1111 (0.0710)	0.1196	0.1056 (0.0699)	0.1327	-0.0667 (0.1260)	0.5970	0.1029 (0.0768)	0.1819
Industry dummies	YES		YES		YES		YES	
Geographical area dummies	YES		YES		YES		YES	
Intercept	-1.6152 (0.8568)	0.0611	-1.0662 (0.8689)	0.2215	4.6786 (1.6757)	0.0050	-0.3648 (0.9742)	0.7085
N	198		198		198		198	
Log likelihood	-239.5460		-235.6830		-88.1470		-237.4900	
R <sup>2</sup>	0.3407		0.3659		0.3147		0.3542	

Standard errors in parentheses.

Model 5 and Model 6 are the same of Model 1 and Model 2, but considering the CEO centric TMT configuration and the sub-sample of 198 observations due to missing data in the instrumental variables. Model 7 and Model 8 are the instrumental variables estimations. Specifically, Model 7 is the first-step *probit* instrumental variables estimate, while Model 8 is the second-step instrumental variable estimate in which we consider the CEO centric TMT configuration predicted using Model 7.