How heterogeneity of power coalition support innovation in family firms

Abstract. Although the innovation literature suggests that both individual qualities and environmental factors impact the level of innovativeness in power coalitions, there is little empirical evidence concerning how team factors determine innovation output. In order to contribute in this direction, our paper aims to investigate the creation of innovation inside the family business related to the composition of the power coalition. For example, family owners increase the heterogeneity by the inclusion of external managers, by the inclusion of the new generation into the management of the business, by the inclusion of family member that differ in terms of age, gender, experience, educational background.

Our conceptual and empirical model (based on a sample of 101 Italian family companies), suggests that family heterogeneity provides innovative outcomes if organizations combine the right individual attributes (i.e. gender, age, educational background and experience) with the size and power structure in the creation of the family team.

How heterogeneity of power coalition support innovation in family firms

Introduction

The generation of creative ideas and their manifestation as new products and technological process are fundamental innovation activities for firms in order to survive in the competitive global landscape. Furthermore, firms' innovative activities create long term growth and prosperity. If this conception is relevant among all firms, it becomes fundamental in the context of family firms that must achieve the long term survival according with their family values and aspirations.

A business is a family business when it is guided by the family's moral and spiritual values and it is sustained by the family's commitment with the goal to passed down to its sons and daughters as a legacy as precious as the family's name (Lea, 1998). Thus, for those firms the long term survival must be a strong goal to achieve. In our paper we investigate how family ownership, governance and heterogeneity influence innovation because it seems to become a relevant main stream of research both in organizational innovation and in family business' agenda.

In order to contribute in this direction, our paper aims to explore the creation of innovation inside the family business related to the characteristics of the composition of the power coalition. More specifically, looking at the family firms' literature, we noted the dynamic and the evolution of the family inside the business. What we argue is that family owners increase the heterogeneity of the power coalition by the inclusion of external managers and the new generation into the management of the business, by the inclusion of family members with different gender, experience and educational background. From a team perspective, this family characteristics and dynamics create a favorable situation for the development of new

ideas related to the potential that a heterogeneous group has to express in terms of innovative output. In fact, this should explain for example the reason why family business researchers note that when multiple generations are involved in the management the organization has a greater innovative output (Kepner, 1991).

Thus, turn our attention on innovation's literature, we observed how creative ideas and their materializations as innovative products and process represent the core of organizational innovation (Amabile, 1988). Creativity inspires the generation of new ideas and is considered one of the necessary determinants of innovation. Despite the importance of generating creative ideas for all firms, the understanding of antecedents and consequences of innovative process and creativity activities is limited (Im, Montoya and Workman, 2013). Although the innovation literature suggests that both individual qualities and environmental factors influence the level of creativity in teams, there is little empirical evidence regarding how team factors determine innovation output (Im, Montoya and Workman, 2013).

Crossing those aspects, our study aims at examining the effect of family group heterogeneity that arises from the age, gender, experience, formation and coexistence of two or more generations of family members on innovative outcomes in family firms. Specifically, taking into consideration how the ability of a family firm to anticipate and respond to opportunities or pressure for change, both internal and external, depends on the group that manage the decision making process - defined as the firm's power coalition (Cyert & March, 1963). We adopt the perspective of this group in order to analysis the creation and the management of innovation inside the family firms.

Thus, drawing on the literature on power coalition and top management team (Hambrick and Mason, 1984), rather than the more deterministic assumptions of population ecology or "life cycle" models, this paper aims to investigate the relationship between the heterogeneity of the family power coalition and the firm innovative outcomes bearing in mind the needs for

this group to have the ability to develop new idea and process in order to achieve the long term survival in the economic landscape. Our theoretical model draws on two main perspectives.

From one side, we consider the role of family ownership and governance inside the business taking into consideration the insights from the power coalition's perspective (Hambrick and Mason, 1984) in the study of the relationship with firm behaviors. Thus, we consider also the heterogeneity that derives from the composition of the power coalitions in terms of age, gender, experience and instruction.

The analysis is conducted using a database of 100 Italian companies. The dataset is heterogeneous in terms of degree of family ownership and involvement but only include includes family owned firms.

The rest of the paper is organized as follows. The first section present our theoretical background, focusing on family firms' power coalition, and identifies the key organizational dimensions of family firms as defined in the literature. The hypotheses that drive our empirical analysis are then derived by discussing the potential impact of family firm heterogeneity on the propensity to introduce innovation output here measured through the use of patents. The third section presents the sample and the empirical methodology. The fourth section discusses the results of the empirical analysis. Finally, we discuss the implications of our finding for future research and for managerial practices.

1. Theoretical Background

1.1 Family firms and the role of power coalition

Family firms are unique organizational forms because of interactions between family members and between the family and the business. These firms create a unique management

situation that result in both advantages and disadvantages in term of results and management. Specifically, in this paper we focus our attention on the role of ownership, governance and heterogeneity on innovation development considering how family firms are often managed by a group of individuals whose collective dynamic has a direct impact on the direction and performance of the firm (Ensley and Pearson, 2005). This group has been defined as power coalition and its influences on firm behaviors (performance) has been one of the most widely studied relationships in strategic management (Certo, Lester, Dalton and Dalton, 2006).

Our interest in the role of power coalition, as opposed to that of individual leaders, is consistent with the definition of family firms as companies in which managerial responsibilities are unlikely to be the exclusive domain of just one individual. Thus, it is important for the field of family business to investigate the ways in which family executives assess and direct family firm strategy. We already know that a firm's top management team identifies environmental opportunities and problems, interprets relevant information, considers organizational capabilities and constraints, and formulates and implements strategic changes (Mintzberg, 1979).

Thus, by focusing on literature regarding top management team (TMT) studies and in contrast with recent suggestions that encourage a moratorium on the use of demographic variables, this study addresses the debate on power coalition demographic research. Because one of the chief responsibilities of top executives is to process information, and because the effective execution of this task leads to an improvement in firm performance. We consider how power coalition affect firm performance because their demographic heterogeneity leads to innovative and creative solutions. Thus, our investigation will demonstrate the need to focus major attention on power coalition heterogeneity, as it can explain the high levels of innovation and creativity in family firms. In examining the management-performance link, we consider that innovative performance in family firms' results from the interactions of the

members that take part of the power coalition. More specifically, taking into consideration the organizational innovation literature, our analysis suggests that this relationship is mediated by the innovation and creativity that rise from the power coaltion's heterogeneity.

1.2 Power coalition heterogeneity and firm's innovative outcomes

Heterogeneity in a power coalition refers to the amount of dispersion inside a team along indicators such as age, gender, organizational tenure, experiences and educational background. Research on strategic leadership is devoted to both conceptual and empirical attention to demographic heterogeneity and has found that power coalition heterogeneity is positively associated with firm processes and outcomes. For example, Eisennhardt and Schoonhoven (1990) demonstrated the positive impact of coalition heterogeneity on creativity. In the same line of investigation, Bantel and Jackson (1989) suggest the positive influence of heterogeneity on innovation.

These results are explained through the role that power coalition plays when processing information to make strategic decisions. In particular, demographic heterogeneity provides resources in the form of multiple types of knowledge and multiple perspectives that are not available in more homogeneous group (Bantel and Jackson, 1989). Furthermore, demographic heterogeneity provides power coalition with increased levels of information. When evaluating the different perspectives and the increased level of information obtained through heterogeneity, researchers observed that heterogeneous group avoid the tendency towards groupthink (Janis, 1972) that is often associated with homogeneous groups (Williams and O'Reilly (1998).

Heterogeneity also produces task conflict, which can generate better decisions (Pelled, Eisenhardt and Xin, 1999). Hambrick and Mason (1984) proposed that demographic heterogeneity serves as a proxy for cognitive heterogeneity in the power coalition. More

recent research indicates that cognitive heterogeneity is associated with task conflicts, which occurs when group members disagree about task issues including goals, key decision areas and the appropriate choice for actions. Research on group behavior suggests that task conflict generates better decisions.

Generally speaking, the advantage of heterogeneity seems to be consistent with the strategic decision-making process, which is described as complex, ambiguous, and multifunctional. Furthermore, many scholars in the strategic management field have characterized the strategy-making process as inherently creative (e.g., Christensen et al., 1982). Porter (1991) states that the firm must be seen as not only optimizing within tight constraints but also having the ability to shift these constraints through creative strategy choices and other innovative activity. Bantel and Jackson (1989) suggest that when solving complex, non-routine problems, teams benefit from having a variety of skills, abilities, and perspectives represented.

Consistent with these perspectives, a series of empirical studies supports a positive relationship between power coalition heterogeneity and firm performance (see, for example, Barsade et al., 2000, on stock market return; Carpenter, 2002 on investment and sales growth; Hambrick et al., 1996, on both market share growth and profit growth). In particular, in the context of innovative actions including new product introductions or first-mover actions, researchers found that group heterogeneity is positively related to the magnitude of innovative behavior (Hambrick, Cho, and Chen, 1996). Heterogeneous teams are braver about innovating than homogenous teams.

Empirical evidence shows that power coalition heterogeneity is associated with higher levels of firm performance, considering the positive influences exerted on the strategic decision-making process. However, another study highlights the disadvantages of heterogeneity. For instance, the fundamental indicator of group heterogeneity is that members

differ from one another. Although these differences may provide the team with a variety of resources, they may also have problematic consequences, especially in regard to interpersonal conflicts.

Consistent with our discussion above, homogeneous power coalitions seem to be more effective in making routine decisions, whereas heterogeneous groups operate more effectively when making indefinite decisions, such as strategic change related to environmental factors. This represents our point of start in order to explain the relationship between power coalition heterogeneity and innovative outcomes in family firms.

2. The relationship between power coalition's heterogeneity and family firm's innovative outcomes

The identification of the key dimensions that characterize family firms' heterogeneity is the first building block to focus our research hypothesis. The overall conceptual model of the relationship between heterogeneity of family power coalition and firm's innovative outcomes is given in Fig. 1. In our earlier discussion, we introduced the relationship between power coalition and firm innovative performance. We assume that in order to explain the behaviors and the results of the family firms, the best lens of observation come from the top management theory perspective.

Since the seminal work of Hambrick and Mason (1984), researchers observed the strategic role of the top management team taking into consideration that individuals that compose the power of coalition assume the strategic decisions in the firm. Thus, in order to appreciate how heterogeneity influences the innovative output of the family firms in this section we will introduce the mediating role of the decision making process in this relationship.
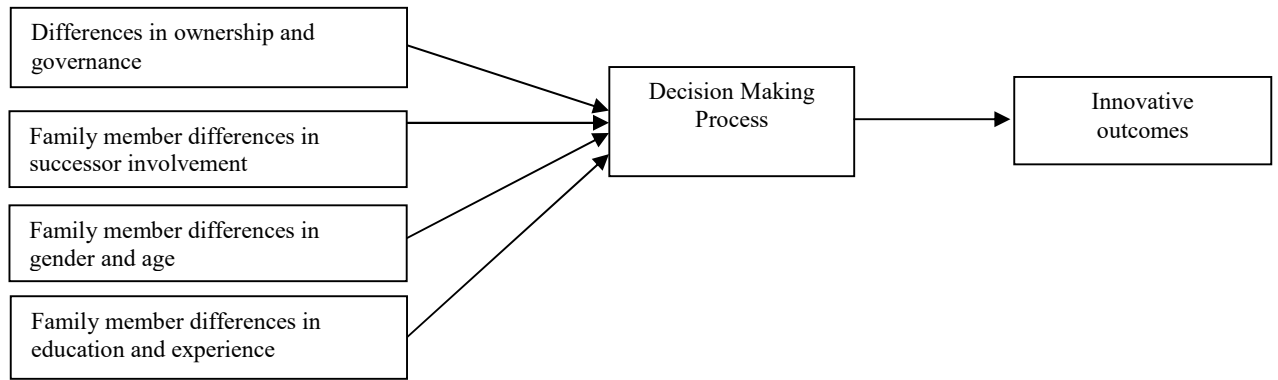
Fig. 1: The relationship between family power coalition heterogeneity and firm innovative outcomes: the mediating effect of the Decision-Making Process

As previously stated the identification of the key dimensions that characterize family firms' heterogeneity is the first building block to focus our research hypothesis. In particular heterogeneity in family power coalitions is present at the levels of ownership, governance, succession, age, gender, educational background and experiences.

Family owners frame problems in terms of assessing how actions will affect risk. In general, ownership significantly influences a firm's strategic choices, especially when the family owns a significant equity stake (Zahra, 2005). When the family has a high stake in a firm's ownership, the firm tends to avoid implementing strategies that could increase the risk (Casillas, Moreno and Acedo 2010). If ownership remains in family hands, the firm can experience a convergence around norms and values (Thusman and Romanelli 1985). However, ownership concentration limits the firm's ability to react promptly to the need for change and more generally, to take advantage of new business opportunities, such as innovation. Based on the considerations presented above, we believe not only that the family ownership dimension is extremely important but also that there is a substantial degree of dependence between ownership and innovation strategy.

As concern governance structure, the participation of family members in the power coalition impacts how decisions are made (Goodstein and Boeker, 1991). Specifically, most researchers

show that external members can be considered a fundamental resource for strategic and decision-making process within a family firm (Corbetta and Salvato, 2004; Fiegener, Brown, Dreux, and Dennis, 2000). They think more freely about different strategic alternatives because they have no family ties and similarly, they can focus on providing top management with independent advice (Westphal, 1999). External board members can represent an important resource in the firm's strategic process; indeed, outsiders bring a range of resources such as expertise, skills and information that can support the adoption of risk, such as the adoption of innovation. Past studies have demonstrated that family involvement in the board of directors reduces the managerial team's strategic independence and limits the firm's access to critical resources for innovation. The absence of nonfamily members on the board of directors limits the firm's access to external critical resources and therefore reduces the scope of innovation, whereas the presence of nonfamily directors can provide greater access to knowledge and capabilities useful to introduce innovation (Sciascia et al. 2013). The risk-adverse attitude that characterizes family firms strategic actions show a parsimonious attitude towards the innovation process, which requires uncertain and significant investments. In summary, when there is high family involvement boith in term of ownership and governance, firms are more likely to accept the cost and uncertainty involved in following certain actions, driven by the principle that the risks that such actions necessitate are counterbalanced by noneconomic benefits. Accordingly, the concentration of governance in the hands of the entrepreneurial family can limit the propensity to innovate if we take into account their conservative, risk-averse attitude (Berrone, Cruz and Gomez-Mejia, 2012).

Accordingly, our first hypothesis is as follows.

Hypotheses 1. – Family heterogeneity in terms of ownership and governance is negatively correlated to innovation.

Heterogeneity is related to the life cycle of the family. More specifically, families follow the natural rhythm of human life. Each new family forms new members and launches new generations. As a result of the family life cycle, new members of the family are constantly being introduced to the firm management group. Thus, the family's development is absorbed by the power coalition.

Similarly, family business researchers note that when multiple generations are involved in the management of a business, the organization has greater input and a greater variety of individual perspectives that are valuable assets for innovative and creative ideas. Newer generations tend to push for new ways of doing things (Kepner, 1991), and they are the driving force behind innovation (Litz and Kleysen, 2001) and entrepreneurial activities (Salvato, 2004).

Several researchers suggest that multi-generational family involvement increases the chances that entrepreneurial opportunities will be recognized and entrepreneurial behavior fostered (Sonfield and Lussier, 2004). Furthermore, the involvement of new generations is a unique resource for the power coalition to avoid the "groupthink" that homogeneous group often encounter. In general, idea conflict is considered functional to group performance. Thus, conflicts related to heterogeneity lead to the consideration of more alternatives, better understanding of the choices, and a more effective decision-making process (Schweiger, Sandberg, and Ragan, 1986).

Moreover, we consider that the long-term nature of family commitment creates an environment that promotes substantive discussion and minimizes or resolves disruptive relational issues for better than in a non-family setting. Power coalition may have developed effective patterns of communication over time to stay together as a family.

In particular, the power coalition risks losing the advantage of being a heterogeneous team if the family power structure is more concentrated in the hands of the older generation and the youngest members feel negatively judged for their creative thinking.

Summarizing, the level of heterogeneity is positively correlated to presence of new generations involved.

Hypotheses 2. – Family heterogeneity is positively correlated with the new generations involved in the business. The greater is that heterogeneity the greater is the innovation output of family firms

The presence of multiple generations increases the family heterogeneity in terms of age, gender and individual perspectives and enhances conflicts that produce new ideas and solutions (see the pioneering study of Janis, 1972; and more recently, Eisenhardt, Kahwajy, and Bourgeois, 1997). More in general most studies on creativity and heterogeneity show that diversity in terms of age and gender enhances the creative problem-solving process because of the variety of ideas generated by different employees. Because heterogeneous individuals are expected to have a broader range of knowledge and perspectives, it is to be expected that the creativity of the group will be enhanced (Bolman and Deal, 1992; Nemeth, 1986; Gardenswartz and Rowe, 1998; Wheeler, 1995).

Following the above arguments, a larger number of generations and different gender involved in the power coalition increase the heterogeneity of the team. Thus, there is a greater likelihood that the family firm will be more innovative and more creative.

Hypotheses 3. – Family heterogeneity in terms of gender and age dispersion is positively correlated to innovation.

Different family members should present differences in educational background as a result of individual investments in educational paths or work experience. In this case, power coalition heterogeneity is the result of different competencies inside the team coming from members' varying investment in educational paths (usually the younger generation) or work experience (usually the older generation). Indeed, considering that one goal of a family is to provide for the education of its members, we consider that the family will provide the best educational path for its members. The most prominent educational institutions are often preferred by the new generation as a factor of family contentment. In the long run, this type of family behavior will improve the educational background of the family management group and will thus increase the likelihood of innovation and creativity in the family firm.

Individual education level is a reflection of personality, cognitive style, and value. Indeed, it has been observed that a higher level of education is related to greater receptivity to innovation (see the earliest work of Becker, 1970). Educated managers have been described to have a greater capacity for and expertise in information-search activities (Hambrick and Mason, 1984). Similarly, Bantel and Jackson (1989) argued that a higher level of education in a team will lead to more comprehensive decisions and thereby to greater innovation.

Following the above arguments, we expect that power coalition with higher experience and higher education levels will possess greater capabilities for innovation and will also have superior performances compared to old-fashioned family management groups where work experience is preferred to education.

Hypotheses 4. – Family heterogeneity in terms of variations in educational background and experiences is positively related to innovation.

Family power coalition's decision-making processes are influenced by the power structure of the family translated into a team. Following Finkelstein's (1992) suggestions regarding the issue of power in top management teams, family power structure is a key factor to explain the decision-making process. In particular, the power coalition risks losing the advantage of being a heterogeneous team if the family power structure is more concentrated in the hands of few family.

This notion is confirmed by the fact that suggesting creative ideas at work can generally be risky, and family tend to avoid risks. Considering the high commitment to success in family firms, individuals' perceived risk in power coalition should be moderated by the family power structure and by the freedom of the youngest generations to share ideas.

The management of conflicts, which refers to the way that the family deals with differences between and among its members, is relevant to bringing out the good side of conflict (Kellermanns and Eddleston, 2004). Hence, the family power structure is a moderator of the relationship between power coalition heterogeneity and the decision-making process. In particular, when the power structure allows more family dialogue and confrontation instead of leading to the discrediting of individuals, the family management group will obtain greater benefits from its members' diversity and have a greater likelihood of being more innovative and more creative.

Hypotheses 5. – Power structures moderate the relationship between power coalition heterogeneity and team performance; the relationship is stronger for power coalition with external participatory leadership than for coalition with family culture.

Finally, there is another potential risk that could decrease the potential of heterogeneous coalition. Although large teams can generate greater output because additional members add

resources and skills to teams, additional members can also complicate the number of possible interactions, thereby decreasing satisfaction and trust among members (Gully, Devine, and Whitney, 1995). As team size increases, team effectiveness increases, as long as the size does not go beyond the optimum team size. Otherwise, the team's effectiveness decreases. Thus, the central issue lies in understanding the optimum size for a family power coalition.

In the literature reviewed, the optimal team size varies according to a number of factors related to the team and the nature of the tasks that need to be accomplished. Generally speaking, a number of studies have suggested that teams consisting of three to five members are ideal because participation and coordination are likely to be more efficacious than in a team with more than five members (Fern, 1982; Shaw, 1981). Small teams seem to lead to increased team cohesiveness, improved communication, and coordination. Thus, the team size also moderates heterogeneity advantages in family power coalitions.

Hypotheses 6. – Power coalition's size moderates the relationship between family heterogeneity and innovation; the correlation is larger for small power coalitions than for large ones.

The model of the hypothesis and the moderating effect between power coalition heterogeneity and the innovation outcome is shown in Fig.2.

Differences in ownership and governance	+
Family member differences in successor involvement	+
Family member differences in gender and age	+
Family member differences in education and experience	+

Participative Leadership

Power coalition size

Decision Making Process
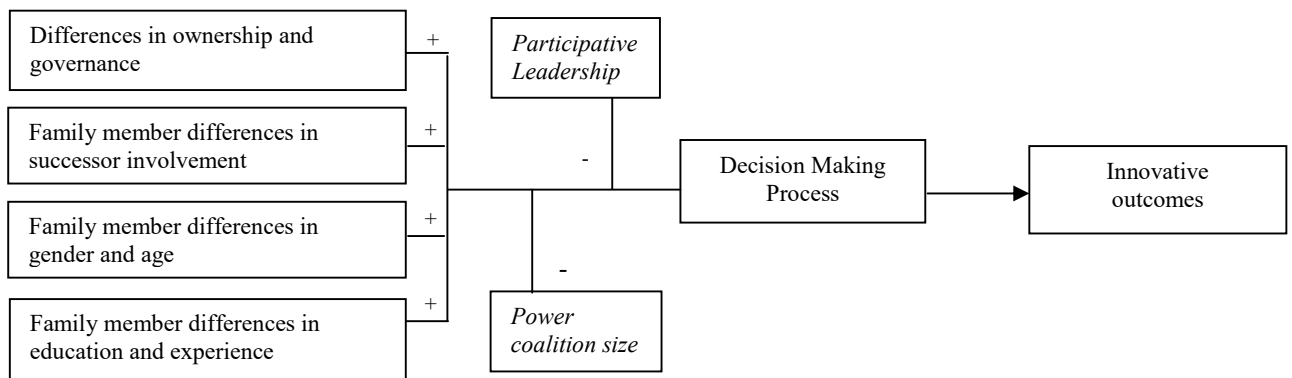
Innovative outcomes

Fig. 2 The moderating effect of family power structure and size on the relationship between F-TMT heterogeneity and innovative and creative outcomes

Summarizing, the above discussion underlies the potential of the family as a heterogeneous power coalition. One of the challenges in analyzing family heterogeneity is the determination of the appropriate composition of variables that influence outcomes in teams (Bowers, Pharmer, and Salas, 2000), and, in consequence, how this heterogeneity influences the decision-making process and firm performance. Here, we improve and complete the potential advantage of heterogeneity of family power coalition compared to heterogeneity as traditionally intended.

3 Empirical Setting

3.1 Data and sample

The empirical sample used to investigate the impact of family firm's heterogeneity on the propensity to innovate consists of 101 Italian companies. The inclusion of pure family owned firms, makes our sample an interesting context in which to determine how multiple dimensions of the family firm heterogeneity impact the innovation output. The impact of the family firm heterogeneity is analyzed by controlling for other firm-specific characteristics that

are generally included in empirical studies of the propensity to innovate: R&D effort, firm size and age, firms' internationalization, financial constraints, profitability, productivity, geographical localization and industry.

Data on innovation output are measured by the number of patent applications. Patent applications were obtained from the Espacenet database, which provides information approximately 90 million patent documents worldwide, including information about inventions and technical developments from 1836 to today. Espacenet is a free online service for searching patents and patent applications. It was developed in 1988 by the European Patent Office and the member states of the European Patent Organisation.

R&D expenditures were retrieved from notes on the accounts, the firms' Websites and applications for public financial incentives to engage in innovative projects.

Data on firms' family characteristics (i.e., ownership structure, composition of the board of directors, the presence of a young successor, age and gender, experience and educational background) were retrieved from the AIDA (Bureau van Dijk) database and firm's web site. More specifically, the AIDA database reports the company name, the year it was founded and the family name of each board member and shareholder with the respective ownership share, thus allowing us to identify kinship relations on the basis of family names.

Balance sheet data (i.e., size, age, financial constraints, profitability and productivity, industry) were also obtained from the AIDA database (Bureau van Dijk).

Information on firm internationalization, here measured by the number of foreign direct investments (FDIs), is drawn from Reprint, which provides a census of Italian outward investments. Reprint classifies FDIs based on the actual location of economic activities. Consequently, we were able to exclude foreign investments made by financial firms, investment funds, private equity funds and merchant banks as part of a management buy-out

and when there is no direct participation in the management of the investee company. For additional details, see Mariotti and Mutinelli (2012).

Finally, firms' data refers to 2008, before the start of the economic and financial crisis. This means that any contingent effects of the economic cycle on our results can be excluded. All patents from 2008 through 2012 are considered.

4.2 The econometric model

The estimated model assesses the impact of family firm heterogeneity on innovation, controlling for firm-specific effects. The model tests hypotheses 1 through 5 by assessing the separate impact of the share of equity controlled by the owner family, the presence of family members on the board of directors, the involvement of successors, the gender and age, the experience and educational background on the attitude to innovate. The propensity to innovate is estimated by a negative binomial regression given the count nature of the dependent variable (Green, 1993).

In order to test hypothesis from 1 to 4 we define the Model 1:

Innovative output = fn (Ownership; Governance structure; Successors; Gender; Age; Experience; Educational background; Control variables) (Model 1)

In order to test hypothesis 5 and 6 we define the Model 2 and 3 where we take into account the moderator effects:

Innovative output = fn (Heterogeneity*Participative leadership;

Control variables)   (Model 2)

Innovative output = fn (Heterogeneity*Power coalition size;

Control variables)   (Model 3)

Where *Heterogeneity* is represented by: Ownership; Governance structure; Successors; Gender; Age; Experience; Educational background

3.2 The dependent and independent variables

The dependent variable for the proposed model is the number of patent (variable *Innovation output*), here measured as suggested by Scherer (1983), namely, by the number of patent applications.

In line with our hypotheses, we first select family owned firms controlling for the ownership. We made the selection trough a binary variable equal to 1 either if a non-listed firm is majority owned by the family or if no less than 20% of a listed firm is owned by the family, and zero otherwise (Cascino, Pugliese, Mussolino and Sansone, 2010). Then we operationalize family businesses heterogeneity through the key dimensions of ownership, presence of family members on the board of directors, involvement of successors, age, gender, experience and educational background of family members.

First, we identify family control as the power to appoint the board of directors, both directly and through financial holdings. This definition is in line with previous studies, according to which family control can be identified as the fractional equity holding by family founding members or descendants (Bannò and Sgobbi, 2015; Tognazzo, Destro and Gubitta, 2013; Lee, 2006; Anderson and Reeb, 2003). The share of family representatives who are members of the board of directors (variable *Governance structure*) is a proxy for the governance structure (Carney, 2005). Perfect managerial governance is characterized by complete separation of ownership and control, thereby splitting management and risk-bearing functions (De Kok, Uhlaner and Thurik, 2006; Fama and Jensen 1983). The final family firm attribute included in our analysis is the participation of at least one young family successor in the business.

Successors is a binary variable equal to 1 if at least one young family member plays an active role in the firm, and zero otherwise.

Age and gender are two binary variable, experience and educational background are respectively a binary variable and a categorical variable, please see Table 1 for the definitions.

In addition to family firm-specific characteristics, firm-specific variables are included in the analysis as control variables. As previously stated, the literature demonstrates that firms have a heterogeneous attitude towards innovation, leading to several studies aimed at identifying the factors that affect the degree of innovation. Because of these studies, we know that innovation depends on the following factors: R&D effort, firm size and age, firms' internationalization, financial constraints, profitability, productivity, geographical localization and industry (e.g., De Rassenfosse, 2010; Chabchoub and Niosi, 2005; Arundel and Kabla, 1998; Mansfield, 1986; Horstmann, MacDonald and Silviniski, 1985).

We include as the control variable a firm's R&D effort (i.e., its R&D expenditure as a percentage of sales). Mäkinen (2007) states that the relationship between patents and R&D effort is very complex to interpret because it can be influenced by R&D productivity.

Further control variables are firm size and firm age, which proxy for accumulated knowledge and experience and usually display a positive correlation with innovation output (Brouwer and Kleinknecht, 1999). Large firms are more likely than small ones to patent routinely instead of carefully evaluating the need to patent each innovation. The reason for this phenomenon is the possibility of spreading the fixed cost of maintaining in-house patent expertise that manages intellectual property rights (Arundel and Kabla, 1998). Another explanation is that large firms are better at enforcing their patents, even when their potential area of use (i.e., the production line of competitors) should largely be hidden from scrutiny (Scherer, 1983). Firm size (variable *Firm size*) is measured by the logarithm of the number of employees, whereas the variable *Firm age* is defined as the logarithm of firm age in 2008.

We enrich the estimation by including the firm's international presence via FDI. The literature suggests that by acting in international markets, firms can better capitalize on the exclusive rents of R&D expenditures and of innovation outputs. Multinational firms offer products to a larger number of potential buyers, thus enhancing profits based on innovation efforts and spreading innovation costs. Internationalization lowers the risk of R&D by avoiding fluctuations and business cycles that are specific to a single market (Kafouros, Buckley, Sharp, and Wang, 2008). Furthermore, international investments enhance a firm's knowledge about the environment and competition in various countries. This knowledge drives the firm's efforts into the most promising innovative objectives (Filippetti, Frenz and Ietto-Gillies, 2009). We proxy international presence through the variable *FDI*, here measured as the logarithm of the number of the firm's foreign subsidiaries.

Because the effective cost of innovation may vary across firms because of differences in the availability and cost of financial resources, we proxy firms' financial constraints by the ratio between their bank debt and total assets (variable *Financial constraints*).

The literature documents a propensity to innovate in the case of firms that have high profitability and productivity (Hanel and St. Pierre, 2002). Specifically, the variable *Profitability* is measured by the ratio between equity and total assets (i.e., the return on equity) and *Productivity* is measured by the logarithm of value added per employee.

We also control for geographical localization. The binary variable *North* takes the value one when the firm is located in the North of Italy, and zero otherwise.[1]

Finally, we include industry dummies as further controls not only because of the significant impact of the industry on the management of innovation (Scherer, 1983) but also because patenting is more extensively used as an intellectual-property protection tool in science-based industries. The analysis controlled for the industry by resorting to Pavitt

---

[1] Wright, Westhead, and Ucbasaran (2007) and Bannò, Piscitello and Varum (2013), for example, discuss how context may impact a firm's performance and strategy.

taxonomy (1984). Five binary variables signal whether the firm belongs to a traditional sector, a scale-intensive sector, a specialized supplier sector, a science-based sector or some other sector (the variables are *Pavitt traditional*, *Pavitt scale intensive*, *Pavitt specialised supplier*, *Pavitt science based* and *Pavitt other*, respectively).

We express all continuous independent variables as logs both to decrease the impact of outliers and to reduce heteroskedasticity.

Variable	Definition	Source
Dependent variables		
Innovation output	Ratio of the number of patent applications at European Patent Office and the firm's R&D expenditure (patents / thousand euros)	European Patent Office, ESPACENET
Family firm heterogeneity variables		
Ownership	Dummy variable taking the value 1 if a non-listed firm is majority owned by the family or a listed firm is 20% owned by the family, and 0 otherwise	AIDA
Governance structure	Share of family representatives who are members of the board of directors (%)	AIDA
Successors	Dummy variable taking the value 1 if at least one younger family member has an active role in the firm, 0 otherwise	AIDA
Age	Dispersion of age	AIDA, web site
Gender	Dummy variable taking the value 1 if there is the presence of female in the board of director	AIDA, web site
Experience	Dummy variable taking the value 1 if the family member made an experience (in another board of director or abroad)	AIDA, web site
Educational background	4 categorical variable representing the level of educational background (from non educated equal to 1 to master degree equal to four)	AIDA, web site
Control variables		
R&D effort	Percentage of firm's R&D expenditure over turnover (%)	AIDA, Website, applications for public funding
Firm size	Logarithm of firm size (employee)	AIDA
Firm age	Logarithm of firm age (years)	AIDA
FDI	Logarithm of the number of past FDIs (number of FDIs)	REPRINT
Financial constraints	Ratio between bank debt and total assets	AIDA
Profitability	Return on equity (%)	AIDA
Productivity	Logarithm of the value added per employee (in thousands of euros)	AIDA
North	Dummy variable taking the value 1 if the firm is located in the North of Italy, 0 otherwise	AIDA
Pavitt traditional	Dummy variable if the firm is in a supplier dominated industry, 0 otherwise	AIDA
Pavitt scale intensive	Dummy variable if the firm is in a scale dominated industry, 0 otherwise	AIDA
Pavitt specialized supplier	Dummy variable if the firm is in a specialized supplier industry, 0 otherwise	AIDA
Pavitt science based	Dummy variable if the firm is in a science based industry, 0 otherwise	AIDA
Pavitt other	Dummy variable if the firm is in an industry not listed above, 0 otherwise	AIDA

Table 1 Definitions and sources of the variables used in the empirical analyses

5. Results of the Empirical Analysis, Discussion and conclusion

The management of innovation inside the family firms appears relevant taking into considerations the long term survival of these firms[2]. The family power coalition involves different family members and their heterogeneity is "chronic" and related to the involvement of new generations in the management of the business. However, heterogeneity will not necessarily make a team more effective.

On the contrary, the success of power coalition is largely dependent on the successful composition of individual attributes, on the family power structure and on the size of the team. This perspective allows researchers and managers to focus their attention to the composition of the power coalition, taking into consideration individual characteristics (i.e. gender, age, experience and educational background), style of leadership inside the power coalition and the optimal size to manage the strategic decision-making process in the firm.

Family firms often face the problematic issue of choosing which son or daughter to include in the team. Often, in the past, the solution was to include only the men of the family. By adopting this strategy, the potential of team gender heterogeneity was automatically lost (culturally refused) by a family firm. Considering the evidence of the positive effect of female management on family firms (Hollander and Bukowitz, 1990; Sharma, Chrisman, and Chua, 1997), it is possible that the team composition of those firms should be reassessed.

Similarly, the issue of the power coalition size should be taken into different consideration following top management team literature review. Families frequently reject the idea of excluding family members from management of family firms. Moreover, the right of hereditary succession supports this logic, which, generation after generation, runs against the firm's business interests. In fact, being owner of a business includes the right to manage the business. In the specific case of family firms, the destiny of ownership and of team is to

---

[2] The empirical results are very preliminary, so they are available only upon request.

expand. However, growth within a team could be a source of disadvantages and, once again, against the firm's business interests.

We believe that understanding various compositional effects of team heterogeneity on the decision-making process and firm creative and innovative outcomes should help organizations align power coalition heterogeneity with their strategic goals and enhance their overall performance. Although the effectiveness of family team is largely dependent on members' characteristics and strengths, organizations and their managers should understand that the potential effects of individual characteristics on the decision-making process and firm performance should be achieved by coordinating and integrating their knowledge into one cohesive entity. The design and coordination of the team is a tool to achieve this goal.

The proposed conceptual model and preliminary empirical results, supported by the integrative review of the top management team literature, suggests that heterogeneity in power coalitions provides strategic decision makers with innovative and creative outcomes if organizations combine the right individual attributes (gender, age, educational background) with the size and power structure to create and manage the team. If teams are created without considering these factors, the same potential advantages can become a source of disadvantages. This may be of primary interest for professionals or family business consultants.

Along these lines, the major mistakes of family firms have been as follows: inclusion of all owners in the power coalitions (larger teams have potential disadvantages in coordination, communication and cohesiveness); the exclusion of women from family firm management; and a hierarchical structure instead of a participative leadership. Further studies in this direction will increase our understanding of the detrimental effects of family behavior in managing and designing power coalition and will help family firms to avoid these risks.

Although the presence of multiple generations may provide the team with variety of resources, cognitive perspectives and knowledge, differences between the generations may also have problematic consequences. The involvement of family members could be problematic with regard to disruptive interpersonal conflicts. However, designing the team composition to accentuate the advantages of heterogeneity and manage the problematic effects of disruptive conflicts can improve the effect of F-power coalition on the decision-making process and on firm performance taking into account the effect of heterogeneity on creative and innovative outcomes.

References

[1] T. M. Amabile, A model of creativity and innovation in organizations, *Research in Organizational Behavior*, **10**(1988), 123–67.

[2] K.A. Bantel, S.E. Jackson, Top Management and Innovations in Banking: Does the composition on the Top Team make a difference?, *Strategic Management Journal*, **19** (1989), 107-124.

[3] S. G. Barsade, A. J. Ward, J. D. F. Turner, J. A. Sonnenfeld, To your heart's content: a model of affective diversity in top management teams, *Administrative Science Quarterly*, **45** (2000), 802-836.

[4] M. H. Becker, Sociometric location and innovativeness: reformulation and extension of the diffusion model, *American Sociological Review*, **35**(1970), 267-304.

[5] L. G. Bolman, T.E. Deal, What makes a team work? *Organizational Dynamics*, **21** (2) (1992), 34-44.

[6] C. A. Bowers, J. A. Pharmer, E. Salas, When member homogeneity is needed in work teams: A meta-analysis, *Small Group Research*, **31** (3), (2000), 305-327.

[7] M. A. Carpenter, The implications of strategy and social context for the relationship between top management team heterogeneity and firm performance, *Strategic Management Journal*, **23**(2002), 275-284.

[8] M. A. Carpenter, M. A. Geletkanycz, W. G. Sanders, Upper echelon research revisited: antecedents, elements, and consequences of top management team composition, *Journal of Management*, **30** (6) (2004), 275-284.

[9] S. T. Certo, R. H. Lester, C. M. Dalton, D. R. Dalton, Top management teams, strategy and financial performance: A Meta Analytic examination, *Journal of Management Studies*, **43**(4) (2006), 813-839

[10] C. R. Christensen, K. R. Andrews, J. L. Bower, R. G. Hamermesh, M. E. Porter, *Business Policy: Test and Cases*, Irwin, Homewood, IL, 1982.

[11] E. Claver, J. Llopis, D. Garcia, H. Molina, Organizational culture for innovation and new technological behaviory, *The Journal of High Technology Management Research*, **1**(1998), 55- 58.

[12] R.M. Cyert, J.G. March, *A behavioral theory of the firm*. Englewood Cliffs, N.J: Prentice-Hall, 1963.

[13] F. Damanpour, Organizational innovation: A Meta-analysis of effects of determinant and moderators, *Academy of Management Journal*, **34**(3) (1991), 555-590.

[14] K. M. Eisenhardt, C. B. Schoonhoven, Organizational growth: linking founding team, strategy, environment, and growth among U.S. semiconductor ventures (1978-1988), *Administrative Science Quarterly*, **35**(1990), 504-529.

[15] K. M. Eisenhardt, J. L. Kahwajy, L.J. Bourgeois, Conflict and strategic choice: how top management teams disagree, *California Management Review*, **39** (1997), 42-62.

[16] M.D. Ensley, A. W. Pearson, An exploratory comparison of the behavioral dynamics of top management teams in family and nonfamily new ventures: cohesion, potency, and consensus, *Entrepreneurship Theory and Practice*, **29**(2005), 267-284.

[17] Fern, E. F. The use of focus groups for idea generation: The effects of group size, acquaintanceship, and moderator on response quantity and quality, *Journal of Marketing Research*, **19** (1982), 1-13.

[18] S. Finkelstein, Power in top management teams: dimensions, measurement, and validation, *Academy of Management Journal*, **35** (1992), 505-538.

[19] L. Gardenswartz, A. Rowe, Why diversity matters, *HRfocus*, **75** (7) (1998), 51-53.

[20] S. M. Gully, D. J. Devine, D. J. Whitney, A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence, *Small Group Research*, **26**(4) (1995): 497-520.

[21] D. C. Hambrick, T. Cho, M. Chen, The Influence of Top Management Team heterogeneity on firms' competitive moves, *Administrative Science Quarterly*, **41**(1996), 659-684.

[22] D.C.Hambrick, P.A. Mason, Upper echelon: the organization as a reflection of its top managers, *Academy of Management Review*, **9**(1984), 193-206.

[23] B.S. Hollander, W. R. Bukowitz, Women, Family Culture, and Family Business, *Family Business Review*, **3**(2) (1990), 139-151.

[24] S. Im, M. M. Montoya, J. P. Jr. Workman, Antecedents and Consequences of Creativity in Product Innovation Teams, *Journal of Product Innovation Management*, **30**(1) (2013),170–185.

[25] I.L. Janis, *Victims of Groupthink*, Houghton-Mifflin, Boston, 1972.

[26] F. W. Kellermanns, K. A. Eddleston, Feuding Families: When Conflict Does a family firms good, *Entrepreneurship Theory and Practice*, **28** (3) (2004), 209-228.

[27] E. Kepner, The family and the firm: A coevolutionary perspective, *Family Business Review*, **4**(1991), 445-461.

[28] J. Lea, What is a family business? More than you think, (1998), Retrieved fromhttp://www.bizjounals.com/triangle/stories/1998/11/02/smallb3.html

[29] R.A. Litz, R.F. Kleysen, Your old men shall dream dreams, your young men shall see visions: Toward a theory of family firm innovation with help from the Brubeck family, *Family Business Review*, **14** (4) (2001), 335-351.

[30] H. Mintzberg, *The Structuring of Organizations*, New Jersey: Prentice-Hall, 1979.

[31] C. J. Nemeth, Differential contribution of majority and minority influence, *Psychology Review*, **93**(1986), 23-32.

[32] E. Ogbonna, L. Harris, Leadership Style, Organizational Culture and Performance: Empirical Evidence from UK Companies, *The International Journal of Human Resource Management*, **11**(2000), 766-788.

[33] L. H. Pelled, K. M. Eisenhardt, K. R. Xin, Exploring the black box: An analysis of work group diversity, conflict and performance, *Administrative Science Quarterly*, **44**(1999), 1-28.

[34] M. E. Porter, , Towards a dynamic theory of strategy, *Strategic Management Journal*, **12** (1991), 95-117.

[35] C. Salvato, Predictors of entrepreneurship in family firms, *Journal of Private Equity*, **7** (3) (2004), 68-76.

[36] D.M. Schweiger, W.R. Sandberg, J.W.D. Ragan, Group approaches for improving strategic decision making: a comparative analysis of dialectical inquiry, devil's advocacy, and consensus, *Academy of Management Journal*, **29** (1986), 51-71.

[37] P. Sharma, J.J. Chrisman, J.H. Chua, Strategic Management of the Family Business: Past Research and Future Challenges, *Family Business Review*, **10** (1) (1997), 1-35.

[38] M. E. Shaw, *Group dynamics: The psychology of small group behavior*, New York: McGraw-Hill, (1981).

[39] M. C. Sonfield, R.N. Lussier, First-, Second-, and Third-Generation Family Firms: A Comparison, *Family Business Review*, **17** (3) (2004), 189-201.

[40] M. Wheeler, Diversity: Business rationale and strategies. A research report, The conference board, *Report Number*, (1995), 1130-95.

[41] K. Y. Williams, C. A. O'Reilly, Demography and Diversity in Organizations: A review of 40 years of Research. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior*, **20**, 77–140. Netherlands: JAI Press, 1998.