

TMT diversity and innovation ambidexterity in family firms

TMT diversity
and innovation
ambidexterity

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The mediating role of open innovation breadth

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Abstract

Purpose – Family firms that simultaneously engage in multiple levels of innovation – incremental and radical – are likely to enjoy performance advantages across generations. The purpose of this paper is to research under which management conditions (i.e. top management team (TMT) diversity in terms of generational or non-family involvement) family firms are more likely to achieve innovation ambidexterity. Also, the paper addresses the mediating role of open innovation (OI) breadth in this relationship.

Design/methodology/approach – A large cross-sectional sample of 335 small- and medium-sized family firms is used. The hypotheses were tested in a mediation model. The relationship between TMT diversity and ambidexterity is measured using a binominal regression analysis, the one between TMT diversity and OI breadth using a Tobit model.

Findings – Drawing on the family firm upper echelon perspective, the results indicate that TMT diversity induced through external managers and multiple generations is positively related to innovation ambidexterity. As the mediation analysis reveals, the relationship can be explained by the higher propensity of diverse TMTs to get involved in OI breadth. The findings add to the discussion on family firm heterogeneity and its influence on different kinds of innovation.

Originality/value – So far, few studies have been concerned with ambidextrous family firms. Contrary to their reputation, this study identifies family firms as radical as well as open innovators. As such, this research takes account not only of the heterogeneity of family firms, but also of the heterogeneity of family firm innovation.

Keywords Family business, Ambidexterity, Innovation, Family firms, Top management team, TMT diversity

Paper type Research paper

Introduction

Innovation in family firms appears to be a paradoxical topic. While family firms have the reputation of being less innovative than non-family firms, one has only to think of companies like Marriott or Hallmark (Litz and Kleysen, 2001) to acknowledge that some of the most innovative firms are long-lived family firms. Research indicates that those family firms that simultaneously engage in multiple levels of innovation – incremental and radical – are more likely to enjoy sustainable performance advantages (Sharma and Salvato, 2011), and to safeguard their long-term viability (Bergfeld and Weber, 2011). Although the literature on family firm innovation is comprehensive, most studies are concerned with the difference between family and non-family firms (for recent reviews see Calabrò *et al.*, 2018; De Massis *et al.*, 2013; Duran *et al.*, 2016; Röd, 2016). As the research field advances, interest in heterogeneity among family firms has become more common (Chua *et al.*, 2012). Studies that have attempted to understand drivers of family firm innovation have pointed out the leadership team as a key determinant (Duran *et al.*, 2016). More precisely, diversity in top management teams (TMTs) can be an advantage for a range of outcomes, like strategic



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agility (Herman and Smith, 2015). In family firms, the family provides unique sources of TMT diversity (Ling and Kellermanns, 2010), i.e. the involvement of more than one generation or of non-family members. Findings on the effects of TMT diversity on family firm innovation, specifically the firm's ability to simultaneously pursue both incremental and radical innovation, are rare. The balance of exploitation of discovered or created opportunities resulting in incremental innovation, and of exploration of the new opportunities, leading to radical innovation, is defined as ambidexterity (March, 1991). Conceptual studies argue that a high concentration of family involvement in management might lead to lower levels of ambidexterity, as later generations might stay away from risky explorative activities (Hiebl, 2015). Family firms that are willing to compensate for disadvantages, like missing internal expertise, by providing TMT diversity in the form of external managers, will increase their ambidextrous ability (Veider and Matzler, 2016). So far, empirical evidence to support these propositions is lacking. Besides, the existing body of research concentrates on the direct relationship between TMT constellations and ambidexterity, without analyzing the context that might lead to higher levels of ambidexterity. The literature on ambidexterity has identified innovation alliances as noteworthy vehicles for exploration and exploitation (Lavie and Rosenkopf, 2006). Specifically, the search scope – how widely a firm explores external knowledge and resources for their innovation activities – defined as open innovation (OI) breadth (Laurson and Salter, 2006) – has a positive impact on innovation (Katila and Ahuja, 2002). The role of innovation alliances in explaining family firm innovation has hardly been considered so far, as existing research tends to focus on innovation input or output, neglecting the importance of innovation activities in understanding family firms' innovation processes (Brinkerink, 2018; Feranita *et al.*, 2017).

The present quantitative research aims to add to the current discussion by investigating under which management conditions family firms are more likely to achieve innovation ambidexterity, taking the process of how they achieve ambidexterity into account. To ensure a high number of ambidextrous family firms in the sample, the study draws on one of the most comprehensive and large-scale surveys investigating the innovation behavior of firms: The Community Innovation Survey (CIS). The final sample consists of 335 family firms of a national sub-sample.

Three major contributions to literature are expected. First, the study takes account of the heterogeneity of family firms by considering how various family-induced management conditions may influence the firm's innovation outcomes. Theoretically supported by the upper echelon perspective, which underlines the importance of the management team for a firm's strategic behavior and choices (Hambrick and Mason, 1984), the particularities of TMTs in the family firm context are discussed. Second, the study will contribute to innovation and ambidexterity research by highlighting family-firm-specific antecedents of the ability to achieve radical as well as incremental innovation, therefore taking a further step toward defining a "family-business-specific ambidexterity" (Frank *et al.*, 2010). Finally, the study takes a closer look at activities that facilitate ambidexterity, specifically the role of OI breadth in the process. The study adds to the OI literature (Chesbrough, 2003; von Hippel, 1988), by linking interfirm relationships with ambidexterity in the unique context of family firms. In conclusion, this research takes account not only of the heterogeneity of family firms, but also of the heterogeneity of innovation (Calabrò *et al.*, 2018).

Literature review and hypotheses development

Upper echelon theory, ambidexterity and OI breadth

The present study draws on a concept rooted in the behavioral theory of the firm, the upper echelon perspective, which purports that behavioral factors, like values and cognitive backgrounds of the firm's dominant coalitions, influence complex strategic decisions

(Hambrick and Mason, 1984). The firm's key leaders and their ability to handle decision alternatives and to deal with conflicts and ambiguity are important for the concept of ambidexterity (Smith and Tushman, 2005). Exploration and exploitation reflect two different learning orientations (March, 1991). While "exploitation refers to learning gained via local search, experiential refinement, and selection and reuse of existing routines, exploration refers to learning gained through processes of concerted variation, planned experimentation, and play" (Baum *et al.*, 2000, p. 768). A complementary set of competences and senior team actions that permit both exploration and exploitation at the same time is required (O'Reilly and Tushman, 2008). Notably, heterogeneity has the potential to provide TMTs with different types of knowledge and decision-making styles and a greater variety of professional perspectives (Koryak *et al.*, 2018). Underlying these orientations of exploitation and exploration are distinct approaches to innovation. While the former will build on existing knowledge and is associated with incremental innovation, the latter will involve the creation of new competences and explorative outcomes, such as radical innovation (Smith and Tushman, 2005). At the same time, the different learning modes of exploration and exploitation require different attitudes toward searching for innovation. Explorative learning especially is related to external search, as new input will increase the likelihood of creating truly new combination (Brinkerink, 2018). The decision to include external partners in the innovation process depends on the behavioral characteristics of the organization's main decision makers (Classen *et al.*, 2012). The scope of search activities especially depends on internal variables such as aspiration and strategic intent (Nelson and Winter, 1982). TMT diversity yields better cognitive capacity to search for solutions far afield, as many personal ties of TMT members provide potential for a variety of alliances (Beckman *et al.*, 2014).

Family TMTs and innovation

Ensley and Pearson (2005) extend the upper echelon perspective to the context of family firms, as the theory is especially helpful in understanding that "the family business creates a unique management situation that results in both advantages and disadvantages to the firm" (p. 267). In the context of family firms' innovation, the family plays a critical role in the balance between exploration and exploitation (Frank *et al.*, 2010). Family business research suggests that family firms suffer from agency problems, associated with lower self-control and nepotism, which may result in less entrepreneurial activities and less willingness to take risks when it comes to radical innovation or joining strategic alliances (Zahra, 2005). On the one hand, shared values, visions and an overarching governance process are important requisites for strategic integration of the firm's exploitation and exploration activities (O'Reilly and Tushman, 2008). Team management can act as a potential driver for ambidexterity, given the team's wholeness and unity of effort (Lubatkin *et al.*, 2006). On the other hand, it is suggested that high cohesion makes groups vulnerable to group thinking (Ensley and Pearson, 2005). A high family ratio in TMTs increases the focus on family goals and values, leading to a pursuit of family utility at the cost of the firm (Sciascia *et al.*, 2013), resulting in an avoidance of risky explorative ventures (Gomez-Mejia *et al.*, 2007). Therefore, the family variable might become a liability with respect to ambidexterity. Another aspect of agency problems concerns the family owners' fear of losing control. Consequently, they are less likely to collaborate with others to achieve innovation (Cassia *et al.*, 2012; Nieto *et al.*, 2015) or to acquire technology from external sources (Kotlar *et al.*, 2013). Well-established traditions might hinder the exchange of information with the external environment, which is why later generation family firms are less likely to be involved in search breadth activities (Alberti *et al.*, 2014). If they form innovation alliances, these tend to take the form of vertical partnerships with universities, public research centers or suppliers, which are less likely to harm their monitoring power (De Massis *et al.*, 2015; Nieto *et al.*, 2015). Furthermore, homogeneous TMTs are associated

with conservative strategies and limited cognitive diversity, which are barriers to a successful OI strategy (Bigliardi and Galati, 2018; Classen *et al.*, 2012). In the next sections, we argue that TMT diversity in family firms is a potential source of innovation diversity. In family firms, the family provides unique sources of TMT diversity (Ling and Kellermanns, 2010), i.e. the involvement of more than one generation in the TMT and the involvement of non-family TMT members.

TMT generational involvement and innovation

Increased generational involvement has been depicted as “the family’s human capital spread across generations” (Chirico *et al.*, 2011, p. 308), which offers the potential for a wider range of strategic options to be considered (Ling and Kellermanns, 2010; Sciascia *et al.*, 2013). The pursuit of innovation goals by multigenerational family firms implies both challenges and opportunities, as the generations might differ in experiences and behavior. Their emotional attachment to the firm will make the senior generation more conservative and less risk-taking over time (Salvato *et al.*, 2010). However, their experience and tacit knowledge is an advantage for exploitative innovation (Patel and Fiet, 2011). The younger generation often possesses higher formal education, which helps them to integrate family-specific knowledge and more explicit generic knowledge (Woodfield and Husted, 2017). When entering the family firm, they are more likely to encourage explorative activities and to push for new ways of doing things (Kellermanns and Eddleston, 2006; Kraiczy *et al.*, 2014). They are often the driving force behind business growth, to ensure the firm’s survival (Kellermanns and Eddleston, 2006). Contrary to this, some studies consider the incumbent generation as entrepreneurs with the necessary background and knowledge to create businesses (Aldrich and Cliff, 2003), and to follow explorative initiatives. In contrast, the successor generations tend to be risk-averse and less pro-active, as their main interest is the preservation of the firm’s wealth and their own socio-emotional benefits stemming from the merits of the firm’s success (Kellermanns *et al.*, 2012). Consequently, they avoid innovative activities which are not within the company’s current domain (Cucculelli *et al.*, 2016). Either way, multigenerational involvement has the potential to produce knowledge diversity due to the different expertise and perspectives of each generation (Kellermanns *et al.*, 2012; Litz and Kleysen, 2001; Sciascia *et al.*, 2013; Zahra, 2005). Furthermore, TMT diversity is associated with higher absorptive capacity with positive effects on family firms’ ability to engage and manage collaborations (Bigliardi and Galati, 2018). Decision makers born into business families can rely on age-old ties and business networks (Miller and Le-Breton-Miller, 2005). Zahra (2005) reports a positive, yet not significant association between multigenerational involvement and joining alliances. With the increase of TMTs cognitive and absorptive capacity, searches for innovation alliances will become broader (Classen *et al.*, 2012):

- H1. TMT generational involvement is positively associated with a family firm’s innovation ambidexterity.
- H2. TMT generational involvement is positively associated with a family firm’s OI breadth.

TMT non-family involvement and innovation

As family firms tend to be reluctant to share control with others (Gomez-Mejia *et al.*, 2007), they face a challenge to fully integrate non-family managers into the business (Zahra, 2005). However, the presence of non-family managers has the potential to create several advantages. The potential cognitive bias of family members may be minimized if alternative perspectives from “outsiders” are considered during decision making (Stanley, 2010). Several studies argue that the strength of the family in the TMT will lead to more exploitative actions to avoid failure and to protect their investments, which will prevent

exploration (Hiebl, 2015) and radical innovation (Li and Daspit, 2016). Without integrating external managers, a family firm may lack qualified personnel (Miller *et al.*, 2015). Prior research has found a high ratio of family managers in the TMT to be associated with less innovation input (Matzler *et al.*, 2015), and with a lower product portfolio performance (Kraiczy *et al.*, 2014). When non-family managers are included in the TMT, they are less concerned with the socio-emotional benefits and therefore will shift the firm's orientation toward financial goals (Gomez-Mejia *et al.*, 2007; Stanley, 2010). They have the reputation of being more rational and objective, as they are less concerned with potential family relationship conflicts. Their higher level of professionalization promotes change and innovation (Cruz and Nordqvist, 2012). In contrast, it may be argued that the business-owning family is the driver of entrepreneurial and explorative activities of the firm (Zellweger *et al.*, 2012). Their long-term orientation and the ambition of the incumbent to extend the entrepreneurial dream through generations (Cassia *et al.*, 2012) should promote explorative projects, and provide the base for future growth (Röhm, 2016). The family's focus on power and control may result in a timely recognition of market demands which fosters explorative activities (Kammerlander and Ganter, 2015). In comparison, non-family managers are often incentivized to focus on short-term financial performance and exploitation (Block, 2011; Hall and Nordqvist, 2008). So, they will be less likely to pursue explorative activities that often yield profits only in the long term (Röhm, 2016). Either way, mixed TMTs combine different cognitive styles, and expand the firm's access to diversified knowledge resources (Li and Daspit, 2016), which will foster ambidextrous outcomes. Teams which include experienced managers have a wider vision of strategic decisions, make use of more information sources and have more differentiated capabilities (Lee and Park, 2006). As it is likely that external managers have gained experience in other firms or markets before joining the family firm, they rely on a diverse network (Sirmon and Hitt, 2003). Prior experience, like the number of previous employers and senior positions held, influences the likelihood of engaging in new alliances (Eisenhardt and Schoonhoven, 1996), and is positively related to the OI breadth of family firms (Classen *et al.*, 2012; Lazzarotti and Pellegrini, 2015):

H3. TMT non-family involvement is positively associated with a family firm's innovation ambidexterity.

H4. TMT non-family involvement is positively associated with a family firm's OI breadth.

The mediating role of OI breadth

A possible solution for resolving the paradoxical requirements of exploitation and exploration is to externalize one or the other by establishing alliances (Holmqvist, 2003; Lavie and Rosenkopf, 2006). Especially in small companies, where resources are often limited (Street and Cameron, 2007), these interorganizational activities may be an opportunity to enable both exploitative and explorative knowledge processes (Rothaermel and Deeds, 2004). Prior research has associated openness to innovation alliances with more innovative performance (Laursen and Salter, 2006), and with the creation of radical innovation (Colarelli O'Connor, 2006). The greatest positive impact on the degree of innovation comes from collaborative networks comprising different types of partners (Nieto and Santamaria, 2007). A diverse network of interorganizational collaboration interactions with users, customers, suppliers, universities and intermediaries is linked with ambidexterity (Faems *et al.*, 2005). First, OI breadth provides the possibility of expanding the knowledge base, to get access to complementary assets and to encourage the transfer of knowledge, which result in the creation of resources that would otherwise be difficult to develop. Second, innovation risk and cost, as well as development process time, may be reduced (Lazzarotti *et al.*, 2017). Considering the prevailing facts of scarce resources and risk aversion in family firms (Röd, 2016),

opening the innovation process to external parties may be a necessary strategic approach to achieve explorative innovation, and thus ambidexterity in family firms. As research suggests, family firms are more likely to establish external alliances aimed at exploration (Pittino *et al.*, 2013). A study by Lazzarotti and Pellegrini (2015) has linked non-family managers' openness to external innovation sources with their focus on an explorative innovation strategy and radical innovation. Therefore, while diverse TMTs may be the driving force of a family firm's ambidextrous innovation strategy, they will have to rely on innovation alliances to reach their goals. Thus, it is concluded that the relationship between TMT diversity and ambidexterity is to be explained by the firm's variety of innovation alliances:

- H5. The relationship between TMT generational involvement and a family firm's innovation ambidexterity is mediated by OI breadth.
- H6. The relationship between TMT non-family involvement and a family firm's innovation ambidexterity is mediated by OI breadth.

Methodology

Data collection and sample

This study draws on the sub-sample of the Austrian contribution of the CIS 2014, provided by Statistik Austria, which is biannually conducted in most OECD countries and based on definitions and methodologies laid down in the Oslo Manual (OECD, 2005). Several studies on family firm innovation have become aware of the benefits of this comprehensive and large-scale survey (Classen *et al.*, 2014; Steeger and Hoffmann, 2016). In Austria, firms with more than ten employees from various industry sectors are selected through random stratified sampling, resulting in approximately 5,500 firms, which is an estimated 35 percent of the statistical population. The average response rate of 50–60 percent resulted in a total of around 2,900 responses. The present study will concentrate only on firms that are identified as family owned and managed. Therefore, as CIS does not provide data on ownership or other family-related variables, the CIS data were linked with data from the Aurelia Neo Database by Bureau van Dijk, which provides information about the distribution of ownership, as well as the names and birth dates of the owners. In addition, this information was verified using several other data sources: firm websites, annual reports, national directories or press articles. In line with the definition of the EU commission and previous research, private firms are defined as family firms, where the family owns at least 50 percent of the firm and at least one family member is active in the management (Classen *et al.*, 2014; Zellweger *et al.*, 2012). The final sample consists of 335 Austrian family firms: 15.7 percent are active in research-intensive industries (e.g. chemicals, electrical/optical equipment and machinery/equipment), 3.3 percent in research-intensive services (e.g. information and communications, architecture and engineering), 44.2 percent in other industries and 36.8 percent in other services. The average firm age is 38.2 years (min. = 0, max. = 244), the average firm size in terms of full-time employees is 121 (min. = 10, max. = 2,267).

Variables and measures

Data measuring the dependent variable innovation ambidexterity are derived from CIS 2014. In the context of private family firms, which are characterized by focused actions resulting in different levels of innovation (Sharma and Salvato, 2011), an innovation output perspective seems adequate. Therefore, the present study links exploration with the creation of radical innovation and exploitation with incremental innovation (Tushman and O'Reilly, 1996). Prior studies have referred to products or services as radical innovations, if they are not just new to the firm, but new to the market, and as incremental, if they are only new to the firm, but have already existing alternatives on the market (Clausen and Pohjola, 2013;

Steeger and Hoffmann, 2016). Therefore, a dichotomous variable is used that takes the value of 1, if the firm is indicated to have launched products/services new to the market as well as products/services only new to the firm in the period from 2012 to 2014. If only one or neither was selected, the variable takes the value of 0. While this measure does not take the absolute values of exploration and exploitation into account (Lubatkin *et al.*, 2006) or their balance (Kammerlander *et al.*, 2015), it offers the advantage of a simple and unequivocal approach.

The mediator variable OI breadth is measured as the number of external partner types that a firm relies upon in their innovation activities (Classen *et al.*, 2012; Laursen and Salter, 2006; Lazzarotti and Pellegrini, 2015). In the CIS, a firm should select which of the seven potential types of innovation partners they have co-operated with between 2012 and 2014: suppliers, customers from the private sector, customers from the public sector, competitors, consultants or commercial labs, universities and government, public or private research institutes. OI breadth is calculated by the sum of the seven categories.

The independent variable TMT generational involvement is measured by the number of family generations involved in the management (Ling and Kellermanns, 2010; Zahra, 2005), with a typical generation measured between 20 and 40 years. TMT non-family involvement is derived from the number of non-family TMT members divided by a firm's total number of top managers (Classen *et al.*, 2012).

The study also controlled for variables that could influence the firm's innovation behavior. Innovation intensity is described as innovation expenditure per employee between 2012 and 2014 in thousand € (Classen *et al.*, 2014). Company size has been identified as one of the most important determinants of innovation and ambidexterity (Rothaermel and Deeds, 2004), and is added as the logarithmic function of the average number of firm employees in the same period (Kraiczky *et al.*, 2014). Company age is considered, as older firms become more likely to resist change and innovation (Zahra, 2005). Using a dummy variable, group indicates whether the firm belongs to a national or international enterprise group (Steeger and Hoffmann, 2016). TMT size, which is measured as the total number of TMT members, can influence the dynamics of a firm's decision-making behavior (Siegel and Hambrick, 2005). In addition, team management (in comparison to management by one top manager) and TMT age ratio are included. Finally, as the level of innovation required to compete in an industry is a predictor of changes in exploration vs exploitation (Allison *et al.*, 2014), controls for firm's industry are added for research-intensive industries, research-intensive services, other industries or other services (Steeger and Hoffmann, 2016). Table I displays the descriptive statistics and correlations of the independent and control variables. While TMT non-family involvement ranges from none to 90 percent of external managers, TMT generational involvement consists of either one or two generations involved. As would be expected, TMT non-family involvement is positively correlated with firm size ($r = 0.321$, $p = 0.01$), belonging to a group ($r = 0.253$, $p = 0.01$), TMT size ($r = 0.608$, $p = 0.01$) and team management ($r = 0.394$, $p = 0.01$). TMT generational involvement has positive correlations with TMT size ($r = 0.298$, $p = 0.01$), team management ($r = 0.412$, $p = 0.01$) and TMT age ratio ($r = 0.780$, $p = 0.01$). The analysis of variance (VIF) demonstrates that no issue of multicollinearity exists, as individual values do not exceed 10, and average value does not exceed 6 (Neter *et al.*, 1989) (Table I).

Analysis and results

The hypotheses were tested using a mediation model. According to Baron and Kenny (1986), full mediation is assumed, when the following four conditions are fulfilled: the relationship between the independent and the dependent variable is significant ($H1$, $H3$); the relationship between the independent and the mediating variable is significant ($H2$, $H4$); the relationship between the mediating and the dependent variable is significant, when controlled for the independent variable; and the effect of the independent on the

Table I.
Means, standard deviations, Pearson correlations and multicollinearity analysis of independent and control variables

	Mean	SD	VIF	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	
1 TMT non-family involvement	0.061	4.479	2.334	0.000	0.900														
2 TMT generational involvement	1.119	3.121	4.028	1.000	2.000	-0.073													
3 Log (firm size)	1.673	1.321	1.534	0.699	3.412	0.321**	0.096												
4 Log (firm age)	1.446	1.331	1.086	0.000	2.387	0.018	0.028	0.216**											
5 Group	0.229	1.402	1.369	0.000	1.000	0.253**	0.063	0.450**	0.099										
6 Other services	0.368	2.975	8.120	0.000	1.000	-0.084	-0.033	-0.087	0.014	-0.020									
7 Other industries	0.442	2.974	8.572	0.000	1.000	0.025	0.024	0.002	0.067	-0.072	-0.679**								
8 Research-intensive services	0.033	ns	ns	0.000	1.000	0.016	0.036	-0.072	-0.118*	0.099	-0.140**	-0.164**							
9 Research-intensive industries	0.157	3.122	5.108	0.000	1.000	0.068	-0.007	0.147**	-0.052	0.076	-0.330**	-0.385**	-0.079						
10 TMT size	1.605	0.874	2.888	1.000	10.000	0.608**	0.298**	0.366**	0.106	0.256**	-0.057	0.060	0.006	-0.009					
11 Team management	0.442	1.648	2.636	0.000	1.000	0.394**	0.412**	0.254**	0.055	0.156**	-0.035	-0.011	0.038	0.042	0.695**				
12 TMT age ratio	0.129	12.809	5.643	0.000	0.390	0.333**	0.780**	0.226**	0.038	0.148**	-0.084	-0.033	0.074	0.054	0.573**	0.683**			
13 Investment in innovation	3.461	0.043	1.061	0.000	181.647	0.037	-0.015	0.075	-0.044	0.100	-0.028	-0.084	0.041	0.131*	0.002	-0.017	-0.007		
14 OI breadth	0.513	0.460	1.343	0.000	7.000	0.230**	0.170**	0.335**	-0.012	0.326**	-0.178**	0.012	0.057	0.192**	0.166**	0.106	0.189**	0.200**	

Note: Significant codes: 0 “***” 0.001 “**” 0.01 “*” 0.05 “****” 0.1 “.” 1

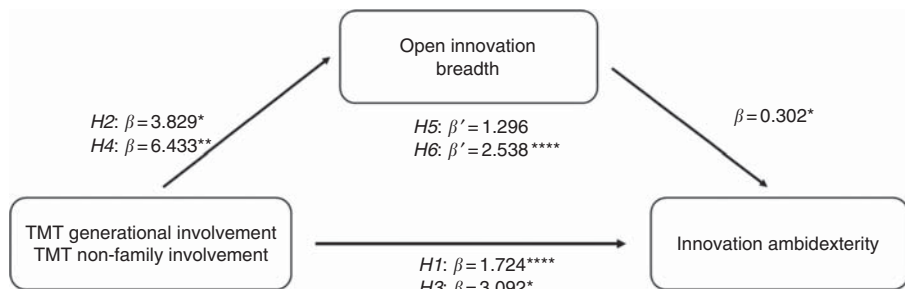
dependent variable decreases in significance and/or magnitude once the mediating variable is taken into account (*H5*, *H6*). To test these assumptions, Model 1 performed a binominal logistic regression, using ambidexterity as the dependent variable. While TMT non-family involvement is positively and significantly related to innovation ambidexterity, TMT generational involvement is positively, yet not significantly ($p = 0.06$) related to innovation ambidexterity. Therefore *H3*, but not *H1* is confirmed. However, a statistical trend supporting *H1* can be recognized. Second, measuring the effect of the independent on the mediator variable OI breadth (Model 2), a panel Tobit specification is used (Tobin, 1958), which seems appropriate, as the sample includes firms that do not get involved in innovation alliances at all, as well as firms with different numbers of alliances. The method has been used in previous studies on family firm innovation, as we are dealing with many non-innovators in this field (Classen *et al.*, 2014; Lazzarotti and Pellegrini, 2015; Steeger and Hoffmann, 2016). The results as displayed in Table II indicate a positive and significant relationship with TMT generational as well as with non-family involvement, confirming *H2* and *H4*. Finally, OI breadth as a mediator variable is included in the bivariate regression analysis (Model 3). As expected, OI breadth is positively and significantly related to ambidexterity. In the case of TMT non-family involvement, the coefficient is lower than in the previous regression, without the inclusion of the mediator variable, and not significant anymore. Thus, full mediation is supported. To test the significance of the mediating effect, a Sobel (1982) test was performed. The results confirm the significance of the indirect effect of TMT non-family involvement on the dependent variable via the mediator ($z = 1.851, p < 0.07$). Therefore, *H6* is supported at a p -value lower than 0.1. In the case of TMT generational involvement, the coefficient is lower than in the previous regression, without the inclusion of the mediator variable and not significant. However, if we follow the strict rule that the relationship between the independent and the dependent variable is not significant at $p = 0.06$, the first condition of full mediation is not fulfilled, Therefore, we cannot confirm full mediation and *H5* is rejected (Figure 1).

Dependent variable	Model 1 (Logit regression) Innovation ambidexterity	Model 2 (Tobit regression) OI breadth	Model 3 (Logit regression) Innovation ambidexterity
Investment in innovation	0.01797**** (0.01068)	0.04893** (0.01726)	0.01342 (0.01063)
Log (firm size)	0.68856**** (0.41689)	1.96243** (0.68339)	0.46482 (0.43000)
Log (firm age)	0.16787 (0.43566)	-0.57234 (0.68449)	0.30132 (0.45317)
Group	0.64866 (0.41003)	1.41843* (0.69766)	0.42882 (0.43438)
Other services	-1.26264** (0.46619)	-3.01473*** (0.83354)	-1.06918* (0.47482)
Other industries	-0.97880* (0.43224)	-1.40895**** (0.72650)	-0.94018* (0.44221)
Research-intensive services	0.09118 (0.81128)	-0.20400 (1.43787)	0.12260 (0.84039)
TMT size	-0.50137 (0.30618)	-0.48019 (0.39236)	-0.47231 (0.31733)
Team management	-0.35142 (0.60351)	-0.84569 (0.90743)	-0.21541 (0.63083)
TMT age ratio	-3.17286 (3.71574)	-4.92605 (5.93261)	-3.18802 (3.92291)
TMT generational involvement	1.72377**** (0.93045)	3.82855* (1.50438)	1.29614 (1.00917)
TMT non-family involvement	3.09228* (1.42112)	6.43282** (2.32881)	2.53777**** (1.49106)
OI breadth			0.30194* (0.12112)
Intercept	-3.78677** (1.27331)	-7.88531*** (2.15416)	-3.39321* (1.36678)
Wald's test	31.4, df = 10***	55.8, df = 12***	36.7, df = 11***
McFadden's pseudo R^2	0.1362335	Log likelihood -247.4 on 14 df	0.1592201

Table II.
Results of regression
analyses

Notes: Standard errors are in parentheses. Significant codes: 0 "****" 0.001 "***" 0.01 "**" 0.05 "*" 0.1 " " 1

Figure 1.
Results of the
research model



Note: Significant codes: 0 “****” 0.001 “***” 0.01 “**” 0.05 “*” 0.1 “.”

Discussion

Discussion of results

The present quantitative research addresses the effects of multigenerational family involvement and non-family involvement on ambidextrous innovation in family firms, considering the mediating role of OI breadth in this relationship. TMT diversity has been identified as an important driver for innovation in family firms. The described effect is even stronger for the inclusion of non-family team members than for multiple generations, which might indicate that the former are more resistant to “group thinking” and to family group pressure. Furthermore, the results highlight the role of innovation alliances in the innovation process. In the case of generational involvement, the influence on innovation ambidexterity is only significant at a p -value lower than 0.1. Therefore, we observe rather than a causal relationship between multigenerational teams and innovation output, a direct influence of those teams on OI breadth, which in turn affects innovation ambidexterity. The findings allow different interpretations. First, diverse TMTs tend to pursue an aggressive innovation strategy in terms of exploration and therefore look for external innovation sources to achieve both radical and incremental innovation, which would support the previous quantitative findings by Lazzarotti and Pellegrini (2015). Second, diverse TMTs are more likely to engage in diverse innovation alliances in the first place, given their higher cognitive and absorptive capabilities and lower level of socio-emotional wealth (Classen *et al.*, 2012). This then results in the input of new ideas from the innovation partners, and thus an ambidextrous innovation outcome. Either way, findings indicate that family firm TMTs rely on sources of external knowledge to be able to create incremental as well as radical innovation at the same time. Therefore, family firms will benefit not only from the input of external managers or the next generation, but also from the input of external alliance partners. An additionally performed multinomial regression analysis revealed that diverse TMTs tend to focus on radical innovation, as they are less likely to achieve only incremental innovation output; therefore, TMT diversity and OI breadth are confirmed as drivers for radical innovation.

Theoretical and practical implications

The findings of this research offer several contributions to family business as well as to innovation research. Primarily, this study adds to the discussion regarding the relationship between family involvement and innovation. So far, findings have been contradictory and inconclusive, which is not surprising given the vast heterogeneity of family firms (Li and Daspit, 2016). By acknowledging that family firms are not a homogeneous group, this study takes a further step in disentangling this complex relationship. More precisely, this research answers a call for research addressing the within-group differences among family firms in

exploration and exploitation (Goel and Jones, 2016). As family firms have the reputation of producing incremental rather than radical innovation and of being reluctant to open up for innovation partnerships (De Massis *et al.*, 2015), it is important to generate more insights into conditions within which family firms stay on course through different levels of innovation (Sharma and Salvato, 2011). This study has identified the family management team as a key deterrent of highly innovative family firms. Thus, the upper echelon perspective in the family firm context is supported. What is more, this study emphasizes that the TMT is dependent on new sources of knowledge to enable novelty. By allowing new input from the succeeding generation and external managers, the firm's learning process is enhanced. To this extent, this study on innovation in the context of family firms is closely related to the topic of organizational learning and the learning orientation of the (family) firm (Choi, 2014). Furthermore, the role of innovation partnerships as enablers of exploration and exploitation is highlighted. They are identified as a necessary path to access the knowledge and know-how (family) firms lack within the organization (Chesbrough *et al.*, 2008). Thus, this study adds to the discussion on how family firms can embrace an open and collaborative approach to innovate (Kellermanns and Hoy, 2016). In conclusion, this study helps to bring light to the topic of family firm innovation heterogeneity, and to recognize family firms as radical as well as open innovators.

Apart from the theoretical contribution, the study aims for high practical relevance and the creation of applicative knowledge (Frank and Landström, 2015). By identifying effective TMT compositions with the ability to change the innovation strategy of family firms, guidance for practitioners is provided. Therefore, the focus was set on measuring drivers that are easier and more likely for family firms to modify such as management structures rather than ownership conditions (Fuetsch and Suess-Reyes, 2017). Especially in times of disruptive change, family firms will have to open up to new technologies and change. Therefore, traditional strategies fostering exploitation and incremental innovation might not be sufficient to stay ahead of the competition. Family liabilities such as risk aversion, closedness to the outside or group thinking, often hinder exploration and radical innovation. They might be overcome by inviting the succeeding generation or non-family members to join the TMT. However, to benefit from their input, they must be provided with the freedom to bring in their own ideas. What is more, neither the new generation nor external managers as such are keys to ambidexterity, but their likelihood to be open to external sources of knowledge. As this is not a given prerequisite, the family should make sure that hired external managers bring in their diverse network acquired through former work experience. The succeeding generation might be well prepared for future responsibilities when gaining non-family firm work experience or when building networks in business schools or other formal institutions. Then, they are likely to provide the necessary knowledge to respond to the challenges of digitalization and the awareness of the importance of innovation alliances to reach their targets. While sources of family firms' longevity are not well understood (Pieper, 2007), the present study has identified family-specific management conditions as an important driver of innovation, and consequently, of a firm's longevity and sustainability.

Limitations

The study has several limitations. First, it is not taking a longitudinal approach, as firm's innovation activities at a three-year period were measured. Therefore, the focus is on contextual ambidexterity and does not consider sequential ambidexterity or how the family firm pursues explorative and exploitative activities over time (Allison *et al.*, 2014). Using several editions of the CIS might provide further insights. Second, due to limitations arising out of secondary data usage, the study measures the outcome of the ambidextrous behavior in terms of product and service innovation, without considering process or marketing innovation. Also, the study does not give insights into the complex processes of the

ambidextrous behavior of the firm. Survey questionnaires with multi-dimensional measurement scales or qualitative studies could provide further insights. Finally, the study does not measure the effect of ambidexterity on firm performance, which is expected to be positive (Lubatkin *et al.*, 2006).

In conclusion, the study provides additional insights into how family firms may succeed in staying highly innovative across generations, by being able to simultaneously combine exploration and exploitation.

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Further reading

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