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Innovation in family firms: The relative effects of wealth concentration versus family-centered goals

ABSTRACT:

Drawing on agency and behavioral perspectives, we disentangle two critical determinants of innovation strategies among family firms, namely, the family's wealth concentration in its business (WC) and the family's emphasis on family-centered goals. Our results from a survey of Australian family firms show opposite and completely independent effects of WC and family-centered non-economic goals (FCG-NE) on family firms' innovation strategies. While higher WC is negatively associated with firm innovation, a greater emphasis placed on FCG-NE has a positive impact, which seems to be the key determinant of innovation strategies in family firms.

Keywords: family firm, innovation, socioemotional wealth, family-centered goals, wealth concentration

INTRODUCTION

The effect of family ownership on firm innovation has been controversial to date (Calabro, Vecchiarini, Gast, Campopiano, De Massis & Kraus, 2019), suggesting an "innovation paradox" in the case of family firms (De Massis, Di Minin & Frattini, 2015; Ingram, Lewis, Barton, Gartner, 2016). Inspired by agency theory, most empirical studies associate family ownership with conservative innovation strategies (Daily & Dollinger, 1992; López-Fernández, Serrano-Bedia & Gomez-Lopez, 2016) and lower levels of innovation (Munoz-Bullon & Sanchez-Bueno; 2011; Block, 2012; Nieto, Santamaria & Fernandez, 2015). Recent work based on behavioral studies and, more specifically, on the socioemotional wealth (SEW) approach (Gomez-Mejia, Haynes, Nuñez-Niquel, Jacobson & Moyano-Fuentes, 2007) called this general finding into question. In line with agency studies, these scholars predict that family owners would underinvest in innovation relative to non-family firms as the risk of failed investments may lead to catastrophic financial and socioemotional losses for the family as a whole. However, building on its behavioral roots, they also predict that family owners may be willing to accept greater risks associated with innovation strategies if this is required to preserve the family's SEW (Chrisman & Patel, 2012; Gomez-Mejia, Campbell, Martin, Hoskisson, Makri, & Sirmon, 2014), that is defined as an integral part of family owners' utility function (Gomez-Mejia, Cruz, Berrone & De Castro, 2011).

The ability to provide a sound theoretical explanation as to why family firms (FFs) may hold contradictory positions of adopting more or less innovative strategies than non-FFs under different scenarios (depending on the threats to SEW) is arguably the main contribution of innovation studies using a behavioral approach (Sciascia, Nordqvist, Mazzola & De Massis, 2015). However, this contingency approach has not solved the ambiguity regarding the final impact of family ownership on firm innovation, so the innovation paradox remains (Calabro et al., 2019). To explain innovation strategies in

FFs, we need to go beyond making across the board comparisons with non-FFs, and focus on identifying the drivers of heterogeneity in innovation strategies among FFs (Chrisman, Chua, De Massis, Frattini & Wright, 2015; Filser, De Massis, Gast, Kraus & Niemand, 2018). To advance in this direction, we focus on disentangling the key determinants of innovation strategies inside FFs.

Existing studies suggest two idiosyncrasies of FFs driving their preferences towards innovation (Duran, Kammerlander, Van Essen & Zellweger, 2016). The first is the proportion of the family's personal wealth that is locked up in the business, which we call the wealth concentration (WC) effect. The second is the importance that family owners attach to the pursuit of business goals oriented to benefit, specifically, the owning family, which we call family-centered goals (FCG). In our study, we investigate these two effects and their interaction on innovation strategies in FFs. While most studies identify these two separate factors influencing innovation strategies inside FFs in their theoretical arguments, they generally rely on the same measure of family involvement (e.g., family ownership and/or management) to account for both types of idiosyncratic aspects of family owners (for an exception, see Sciascia et al., 2015). As a result, behavioral studies do not distinguish between the family's role as an investor group (i.e., the WC effect) from its unique family-centered goals (i.e., the FCG effect) for the business. Moreover, the use of family ownership alone entails theoretical limitations and empirical indeterminacy to capture the heterogeneity that may exist among FCG across different family businesses (De Massis, Kotlar, Mazzola, Minola & Sciascia, 2018), which seems to be quite large (Chrisman & Patel, 2012). Through their ownership in the firm, family owners may derive family-centered economic outcomes (FCG-E), such as ensuring family control and family's need for financial security, but also family-centered non-economic goals (FCG-NE), including societal contribution and family harmony (Kotlar

& De Massis, 2013; Basco, 2017; Holt, Pearson, Carr & Barnett, 2017). How these two classes of goals interact in determining a family firm's innovative strategies remains poorly understood (Kotlar, De Massis, Fang & Frattini, 2014).

Using a survey of 166 Australian FFs, we measure and empirically test the distinct effects of these three critical drivers of innovation, WC, FCG-E and FCG-NE, as well as their potential interactions. Thus, we investigate the impact of these three variables on the degree to which FFs (1) carry out more or less innovations and (2) follow Prospector vs Defender strategies, using the well-established categorization of corporate strategies suggested by Miles and Snow (1978).

Our study contributes to the family business literature in several aspects. First, by disentangling WC, FCG-E, and FCG-NE effects, we reconcile apparent theoretical and empirical contradictions in the literature regarding the family antecedents of FF innovation. Our findings show opposite and completely independent effects of WC and FCG-NE on FFs' innovative strategies. As predicted by agency theory and the behavioral approach, both perspectives have something to contribute to our understanding of innovation, and they are not incompatible, even though they have the opposite effect.

Our work also contributes to refining behavioral studies of firm innovation, and more specifically, to the SEW approach. Current applications of the SEW perspective suggest that owning-families' preoccupation with maintaining control over decision-making (a key FCG-E goal) drives family owners risk aversion, thereby making them less willing to invest in innovation (Gomez-Mejia et al., 2014). Our results suggest that the lack of wealth diversification (i.e., high WC) is negatively associated with innovation in FFs, while FCG-E have no association with innovation. Furthermore, our results reveal that a greater emphasis on FCG-NE is positively associated with innovation in family firms. This study contributes to enlarge the SEW approach as we show when FFs are

willing to accept higher strategic risks, even in the absence of financial distress conditions.

Finally, we also respond to calls for identifying the drivers of heterogeneity within FFs, particularly regarding their innovation strategies (Chrisman et al., 2015; Filser et al., 2018). Our results suggest that family ownership does not univocally result in decisions that either foster or inhibit innovation in FFs, but that such decisions may depend primarily on the relative importance of WC and FCG-NE to family owners.

THEORETICAL BACKGROUND

Theoretical perspectives on innovation strategies in family firms

Inspired by agency theory, studies on FF innovation suggest that FFs' innovative behavior and risk-taking preferences are embedded in the ownership structure of the firm (Bennedsen & Foss, 2015). From this perspective, family principals are portrayed as a distinctive group of owners that bear high ownership risk resulting from concentrated levels of wealth invested in the FF (Anderson, Mansi & Reeb, 2003; Andres, 2008; Bianco et al., 2013). Low wealth diversification implies that the family's welfare is mainly dependent on one business (Gedajlovic, Lubatkin & Schulze, 2004). As a consequence, when their wealth is highly concentrated in the FF, family owners are relatively more sensitive to financial losses in their firms when making strategic decisions than diversified shareholders. In line with these arguments, scholars argue that reduced wealth diversification leads to cautious innovation behavior in FFs (Duran et al., 2016), hence suggesting a negative relationship between family ownership and firm innovation (Block, 2012; Morck & Stangeland, 2000; Casillas, Moreno & Barbero, 2010).

However, recent empirical research examining the family ownership-innovation relationship shows that FFs are willing to embrace high strategic risk, such as increasing

R&D investments (Chrisman & Patel, 2012; Gómez-Mejia et al., 2014; Kotlar et al., 2014; Patel & Chrisman, 2014) and technology acquisitions (Kotlar, De Massis, Fratinni, Bianchi & Fang, 2013). FFs are more likely to do so when performance falls below the owning family's profitability target. This behavior suggests that agency theory may not adequately explain the innovative behavior of FFs and may need some adaptation. A stream of FF research has incorporated arguments from behavioral decision research, more specifically from the behavioral agency model (Wiseman & Gomez-Mejia, 1998), to advance the understanding of the unique risk preferences of family owners. According to this behavioral perspective, FFs behave in a way that favors the pursuit of FCGs over purely financial goals. This is because the reference point for making business decisions is the preservation of SEW, that is, the "non-financial aspects of the firm that meet the family's affective needs" (Gomez-Mejia et al.; 2007, p. 106). In line with agency theory, behavioral studies predict that family owners tend to underinvest in innovation, as innovation projects may threaten the family's SEW by reducing family influence over the business or by jeopardizing the family legacy, two key SEW dimensions (Chrisman & Patel, 2012; Gomez-Mejia et al., 2014). However, they challenge agency theory by arguing that risk-averse families are willing to take risks associated with innovation projects if they perceive a significant risk to their SEW when performance falls below aspirations (Gomez-Mejia et al., 2014; Patel & Chrisman, 2014; Kotlar et al., 2014).

A closer look at the aforementioned theoretical perspectives shows that what distinguishes them is not necessarily their assumptions about how family ownership influences innovation, but the underlying mechanisms that drive family owners' preferences in each case. According to agency studies, FFs are unique to the extent that they have stockholders (i.e., the family owners) that are less diversified and indeed have a significant percentage of their personal wealth tied up in the business (Anderson et al,

2003). Hence it is ultimately the amount of the family's personal *wealth concentrated in the family firm* (WC) that drives risk aversion in family firms and their willingness to adopt innovative strategies. Behavioral studies further suggest that family stockholders have the power and authority to pursue goals aimed at benefiting the family (*family-centered goals*, FGC) in addition to the traditional profit-maximizing goals of businesses (Chrisman, Chua, Pearson & Barnett, 2012; Chua, Chrisman, De Massis & Wang, 2018). Accordingly, they identify FCGs, which non-FFs do not have, as an important influence on FF strategies, particularly their degree of innovation (Duran et al., 2016). The fact that most extant research on innovation in FFs does not distinguish between these two underlying mechanisms, WC and FCG, may explain the lack of conclusive empirical results and apparent contradictions in existing research, as we discuss in the following section.

Empirical evidence on innovation in family firms

Table 1 provides a summary of key empirical studies examining innovation in FFs (for systematic reviews of innovation in family firms, see Calabro et al., 2019 and Feranita, Kotlar & De Massis, 2017). Common measures of innovation include variations of the innovation dimension of the Entrepreneurial Orientation construct (e.g., Kellermanns, Eddleston, Sarathy & Murphy, 2012), input measures of innovation such as R&D intensity (Gomez-Mejia et al., 2014; Chrisman & Patel, 2012; Block, 2012), and output measures of innovation, such as the number of new patents (Block, Miller, Jaskiewicz & Spiegel, 2013), product innovation (De Massis, Kotlar, Frattini, Chrisman & Nordqvist, 2016) and discontinuous technology adoption (Konig et al., 2013). In line with agency and behavioral studies, prior studies overwhelmingly suggest that FFs tend to adopt more conservative approaches to innovation. For example, FFs are more likely to adopt a “stick to one's knitting” defender strategy (Daily & Dollinger, 1992). They

exhibit lower levels of investment in R&D (Anderson, Duru & Reeb, 2012; Muñoz-Bullón & Sanchez-Bueno, 2011), and are less likely to produce radical innovations (Nieto et al., 2015). Despite these findings, there is some evidence that suggests that FFs may be superior in converting R&D expenditure into innovation outputs (Duran et al., 2016).

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Insert Table 1 about here
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Consistent with the growing interest in understanding heterogeneity in FFs (Memili & Dibrell, 2019), several studies have sought to identify factors that explain heterogeneity in FF innovation. These include the influence of CEO tenure (Zahra, 2005), the level of family involvement (Casillas et al. 2010; Liang, Li, Yang, Lin & Zheng, 2013), risk-taking propensity (Anderson et al., 2012; Kraiczy, Hack & Kellermanns, 2015; Meroño-Cerdán, López-Nicolás, & Molina-Castillo, 2018) and FF's performance hazard (Gomez-Mejia et al., 2014; Patel & Chrisman, 2014). However, these studies often provide conflicting results. For example, both risk-taking (Kraiczy et al., 2015; Naldi, Nordqvist, Sjöberg & Wiklund, 2007) and risk-aversion (Meroño-Cerdán et al., 2018) have been found to be positively associated with innovation in FFs. Similarly, high family involvement in the top management team has been found to positively (Casillas et al., 2010) and negatively (Liang et al., 2013) moderate the effect of innovation on FF performance. Ultimately, it is not clear whether FFs are indeed more or less willing to adopt innovative strategies than non-FFs and why.

Despite the unique feature of FFs that seem to result from the reduced diversification of their principals from an agency theory perspective, only one article (Sciascia et al., 2015) directly measured the effect of WC on FF innovation. As an alternative approach, behavioral and SEW perspectives have also been used to explain the innovation behavior of FFs. However, while theoretical development portrays SEW

as a multidimensional construct (Berrone, Cruz & Gomez-Mejia; 2012) and points to the diverse nature of FCGs (Kotlar & De Massis, 2013), most empirical studies focus on comparing innovation in family and non-family firms. Also, these studies assume that the importance placed on SEW objectives is equal across FFs. Only recently, studies have attempted to directly measure the influence of SEW on innovation (Fisler et al., 2018; Brinkerink & Bammens, 2018; Kosmidou & Ahuja, 2019). These studies suggest that SEW is not a monolithic concept and that there may be differential impacts of its dimensions on FF innovative behavior.

In summary, behavioral studies have expanded the early contributions of agency theory to our understanding of FF strategic choices, mainly by adding the importance of FCG as a key factor affecting FF's innovative strategies. However, empirical studies have not yet distinguished between WC and FCG effects, which are both usually operationalized by using the measure of family ownership or control. Further, they have assumed that FFs are homogeneous in their emphasis on SEW considerations (Gu, Lu & Chung, 2019). As a consequence, they ignore the potential influence of SEW heterogeneity among FFs on their strategic behavior. In the next section, we will disentangle how family owners' idiosyncratic preferences, driven by their WC and the importance they attach to FCG, relate to innovation strategies of FFs.

HYPOTHESES

Wealth concentration and family firm innovation

Scholars inspired by agency theory generally suggest that risky strategic decisions, such as committing resources to innovation, tend to be avoided when the share of a family's total personal wealth invested in one firm increases (Schulze, Lubatkin, Dino & Bucholtz, 2001). However, with some recent exceptions (Sciascia et al., 2015), empirical

studies often infer the WC effect on innovation inputs and outputs by using a measure of family involvement, such as family ownership (Anderson et al, 2003; Gomez-Mejia et al., 2007). While family ownership and family wealth concentration are obviously positively related, the former does not capture wealth that family members have invested outside the business. Research conducted by Zellweger, Nason & Norqvist (2012) showed that the mean number of firms controlled by a family is 3.4 firms, and only 10% of their respondents controlled just one firm. Thus, there seems to be substantial variability in the amount of WC that family owners invest in the firm, which may influence whether FFs may be more or less open to innovative strategies.

We argue that family ownership may not correctly capture the consequences of business failure on total family wealth (both financial and socioemotional) since it provides an incomplete picture of risk-bearing for family owners. If an owner has invested most of his/her personal wealth in the FF with no or limited diversification, he/she would be much more sensitive to the uncertainty resulting from innovation projects than in the case of a diversified owner with the same ownership stake (Sciascia et al., 2015; Zellweger & Dehlen, 2012). Rather than the percentage of family ownership being the main driver of innovation as speculated in previous studies, we argue that it is the family owners' WC in the firm that results in lower levels of innovation in FFs. As a consequence, we propose the following hypothesis:

H1. There is a negative association between the adoption of innovation strategies by family firms and the family owner's personal wealth invested in the business.

The influence of family-centered goals

In addition to family WC effects, some studies argue that FCGs may influence innovation capabilities (Kammerlander & Ganter 2015; Brinkerink & Bammens, 2018). However, empirical evidence on the effect of FCG on firm innovation is inconclusive.

This is primarily due to the overreliance on archival data, which has forced researchers to use coarse proxies to identify the presence of FCG (e.g., percentage of family ownership, family leadership) (Schulze & Kellermanns, 2015). Behavioral studies highlight that FFs behave in a way that favors FCGs over profit maximization (e.g., Chrisman & Patel, 2012; Patel & Chrisman, 2014). Accordingly, FCG are defined as goals that do not have a direct tangible monetary value (as opposed to business goals that emphasize financial performance) and occurs at the family level (as opposed to the firm level) (Kotlar & De Massis, 2013). Extant research recognizes that not all FCG have the same meaning so that not all of them can be grouped together as one variable (Holt et al., 2017; Basco, 2017).

We can distinguish between two types of FCG: a) family-centered economic goals (FCG-E), primarily directed to ensure the financial well-being of the family and its control over the strategic direction of the firm (Kotlar & De Massis, 2013), and b) FCGs that are non-economic in nature (FCG-NE), such as the creation of a unifying vision for the family and promoting family social status and reputation. While theoretical definitions of SEW acknowledges a variety of sources including both economic and non-economic goals (e.g., Gomez-Mejia et al., 2011; Berrone et al., 2012), extant work only include references to family-centered non-economic goals when referring to SEW (e.g., Kotlar et al., 2014; Chua et al., 2018). In the next section, we explain why, although both FCG-E and FCG-NE are directed to benefit the family, they each will exercise a distinct impact on FF's innovation.

Family-centered economic goals and firm innovation

Behavioral studies on FF innovation suggest that family owner's focus on maintaining family control and independence, a key FCG-E for the family (Kotlar & De Massis, 2013), limits the family's willingness to invest in innovative activities (Block et

al., 2013; Fislser et al., 2017). The underlying argument is that engaging in innovation may require specialized human capital investments outside the family pool or substantial equity investment from outsiders that may jeopardize family control over the business (Gomez-Mejia et al., 2014; Nieto et al., 2015). Moreover, pursuing FCG-E priorities related to ensuring family influence may include safeguarding managerial positions for family members (Gomez-Mejia, Nunez-Niquel & Gutierrez, 2001). The use of nepotistic practices to fulfill FCG-E may translate into managerial entrenchment (Firfiray, Cruz, Neacsu & Gomez-Mejia, 2018) that, in turn, may lead to strategic stagnation (Bloom & Van Reenen, 2007).

Further, several studies suggest that the family owner's desire to ensure financial security for the family as an important FCG-E may be negatively associated with firm innovation. The need to provide a regular income to the family leads to accumulating substantial cash flows to satisfy the family's need for stability (De Massis et al., 2015). Thus, strong FCG-E may be negatively associated with family firm innovation by reducing the amount of available resources for the exploration of new opportunities (Schulze et al., 2001; Morck & Yeung, 2004) and by favoring inflated compensation or dividends over growth (Munari, Oriani & Sobrero, 2010). Accordingly, we argue that a high emphasis on FCG-E would lead to lower levels of innovation in the strategy of FFs. Formally stated:

H2. There is a negative association between the adoption of innovation strategies by family firms and the importance of FCG-E.

Family-centered non-economic goals and firm innovation

Family business research generally argues that the presence of FCG may give family owners greater incentive to act as stewards over the continuity of the enterprise

(Arregle et al., 2007; Miller & LeBreton Miller, 2005). However, this should be the case only for the FCG-NE associated with family ownership, and not for the FCG-E discussed earlier. Family owners with strong family-centric non-economic priorities such as family cohesion tend to emphasize responsible ownership and commitment to the long-run success of the firm (Eddleston & Kellermans, 2007), which may outweigh the potential risks of innovation (Filser et al., 2018).

Furthermore, the perpetuation of the family identity and the maintenance of the FF reputation, as examples of FCG-NE, requires the firm to remain competitive in the long run (Strike, Berrone, Sapp & Congiu, 2015). This entails risk-taking to capitalize on economic opportunities (Gomez-Mejia, Neacsu & Martin Gomez-Mejia, 2019), including expanding the firm's market share (Miller & LeBreton-Miller, 2005) or a greater inclination to sacrifice short-term gains for long run and risky payoffs (Lumpkin and Brigham, 2011). In such cases, family owners would not see the commitment of resources to innovation as a threat to family wealth. Instead, they would view the commitment as an important means for achieving both family and business goals, since for them, family well-being and firm long-term survival are closely linked (Chrisman & Patel, 2012; Fisler et al., 2018). Hence, an emphasis on FCG-NE should be positively related to the adoption of innovation strategies in family firms. Consequently, we hypothesize:

H3. There is a positive association between the adoption of innovation strategies by family firms and the importance of FCG-NE

Interaction between family-centered goals and wealth concentration

We have hypothesized a distinct effect of each of the different underlying mechanisms of FF's innovativeness, but they may interact with each other. However, a priori, it is far from evident whether WC and the two types of FCG are complementary, substitutes, or fully independent.

Some authors noted that while both FCG-E and FCG-NE are fundamental aspects of the family owners' affective endowment, FCG-E tend to be more short term oriented compared to FCG-NE (Berrone et al., 2012; Gomez-Mejia et al., 2019). We discussed earlier that the enjoyment of family control and financial security might bring immediate economic benefits to the family. However, it would also reduce the resources available for innovation in the future (De Massis et al., 2018). In contrast, the attainment of FCG-NE, such as the perpetuation of the family identity, requires the firm to remain competitive in future. As a consequence, for families that emphasize FCG-NE, innovation is an important means for ensuring firm continuity and their SEW endowment in the long run (Chrisman & Patel, 2012). The differences in time horizon of the FCG imply the need to distinguish between FCG-E and FCG-NE when considering their potential interaction with WC.

Family business studies suggest that as WC increases, family owners will place more emphasis on preserving the current wealth for the family, even at the expense of sacrificing future family wealth (Chrisman & Patel, 2012; Sciascia et al., 2015). Hence, to the extent that high WC in the business induces the owners to be more short-term focused, the positive effect of FCG-NE on firm innovation is likely to be smaller when there is a greater percentage of family wealth concentrated in the firm. This suggests a substitution effect between these two drivers of innovation in FFs. On the contrary, the effects of WC and FCG-E are likely to reinforce each other, as an increase in the percentage of family wealth locked in the firm increases family owners' tendency to divert resources from innovation to accrue immediate benefits to the family. Formally stated:

H4: The negative association between the adoption of innovation strategies by family firms and the importance of economic family-centered goals (FCG-E) in the business will be greater for firms with higher WC.

H5: The positive association between the adoption of innovation strategies by family firms and the importance of non-economic family-centered goals (FCG-NE) in the business will be smaller for firms with higher WC.

METHODOLOGY

Data collection and sample

We developed a survey to collect the data for our analysis of WC and FCG in family firms, generally using instruments previously utilized in academic research. The questionnaire contained six sections: key decision-maker profile; firm characteristics; ownership, governance, and management; family issues (family-centered goals and achievement, management, and ownership succession); business issues (business objectives, performance, strategies, and entrepreneurial orientation); and future outlook. The survey instrument was further refined based on the feedback received from a pilot of the survey that included ten family firms, five family business advisors, and five academic researchers.

To build our sample, we contacted all the Australian family-owned businesses listed on the membership database of Family Business Australia, Australia's peak body for family businesses. This sample was further supplemented with additional firms that were clients of a large professional services firm. Although this is not a random sample, it is a large sample that includes most of the iconic Australian FFs. The questionnaire was sent to the most senior decision-maker, generally the CEO, of 1,700 Australian FFs together with a cover letter explaining the purpose of the study. Follow-up correspondence was sent two weeks after the initial distribution of the questionnaire, resulting in 188 completed questionnaires received. After accounting for incomplete surveys returned, a total of 166 questionnaires were used for this study (response rate of 9.8%).

All the firms were privately-owned (not traded on the Australian stock market) and wholly family-owned (100% family ownership). The age of the firms ranged widely from 2 to 170 years, being 45 years old on average. In 112 of the firms, it was the CEO who was the respondent of the survey. In only 4 cases, the respondent described himself as a top manager (i.e., not the CEO, Director, CFO or Chairman), but not a member of the owning family. The results do not change when these 4 cases are dropped from the sample. Thus, the respondents seem to have enough knowledge about the owning family, including the key variables about WC of the largest family stockholder in the firm and the FCG that may influence the firm's strategy.

Main variables

The main instruments and the specific items in the survey are shown in Table 2.

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Because we are specifically interested in understanding the role of WC and FCG on the adoption of innovation strategies by FF at the organizational level (as opposed to individual preferences toward risk), our hypotheses focus on two types of strategic choices at the firm level that have been previously studied in the literature, namely firm innovation and business strategy.

Firm innovation

While the empirical literature has usually investigated R&D intensity, firm innovation is a broader concept that goes beyond R&D investment. To capture firm innovation, we used a scale based on the three-question instrument developed by Covin and Slevin (1989), widely used for measuring the innovation dimension of EO (e.g. Li & Atuahene-Gima, 2001; Lumpkin, Cogliser & Schneider, 2009). For each item,

respondents were asked to indicate where the firm is positioned between two opposing statements when evaluating the changes in products and services in the previous five years (e.g., changes have been mostly of a minor nature vs. usually been quite dramatic). As discussed below and reported in Table 2, we used confirmatory factor analysis to assess the reliability of all the scales in our study, including firm innovation.

Business Strategy

To investigate the robustness of our results to alternative measures of strategic innovation, we relied on the Miles-Snow category (Miles & Snow, 1978). Instead of relying on recent product/service changes, this instrument is broader in its scope and more based on the organizational skills for carrying out innovative and risky strategies in the future. In contrast to Porter's (1980) generic strategies that focus on market positioning, this categorization reflects the degree to which the firm follows a defensive strategy versus a more disruptive approach in its overall strategic direction. Prior research suggests that firms with greater family ownership are more likely to adopt defender strategies (Daily & Dollinger, 1992). Respondents were given four statements which outlined an Analyzer, Defender, Prospector, and Reactor business strategy. Respondents that chose the statement "We stick to what we know how to do and do it as well as or better than anyone else" were identified as having adopted a Defender strategy (41% of the firms in the sample). In contrast, 43% of the firms followed a Prospector strategy ("We are innovators and are willing to take the necessary risks of providing new products and services"). The few remaining firms followed either an Analyzer ("We do not want to be first in our industry to offer an unproven product or service, but we try to be close behind with a similar product or service that is competitive") or Reactor ("We do not follow a specific program or plan for making us more competitive, although, when we are faced with strong threats, we definitely make changes") strategies.

Wealth concentration

Following Sciascia et al. (2015), the overlap between family wealth and firm equity was measured by the item: "To the best of your knowledge, what percentage of the largest individual shareholder's personal wealth is tied up in this business vs. invested outside the business (e.g., in property, shares, other businesses)?" An ordinal measure was adopted along a 4-point Likert scale: less than 25% of personal wealth, between 26% and 50%, between 51% and 75%, and over 75%. We decided to focus on the largest family shareholder's wealth locked in the firm and not on WC of the family as a whole, given the difficulties in objectively measuring the family's WC as a whole when there are numerous family shareholders involved. Furthermore, the largest family shareholder is likely to yield the greatest influence on the strategic decision-making of the firm, which was always wholly owned by one family in our sample.

Family-centered goals, economic and non-economic

Drawing on previous work on goals of family owners (Basco, 2013; Holt et al., 2017; Kotlar & De Massis, 2013; Sorenson, 1999, 2000), we developed three items to assess the importance of purely economic goals for the family (i.e., financial security, family wealth, and independence/control) and three items to assess the importance of non-economic goals (i.e., family cohesiveness, name recognition, and unified vision). Respondents evaluated the relative importance of each of these goals for their family business using a 5-level Likert scale from 'not important at all' to 'extremely important'. The items and their loadings for each of the two scales are displayed in Table 2.

Control variables

Firm performance

Researchers on the risk-return relationship inspired in the behavioral theory of the firm have shown that firms with lower performance tend to be more willing to take risks, arguably pursuing more innovative strategies (e.g., Fiegenbaum & Thomas, 1988). To remove its impact, we included in our analysis one variable that captures firm performance relative to competitors. This variable measures the firm's ROA in contrast to its major competitors in the previous year using a 7-point Likert scale from 'much better' to 'much worse.'

Firm size

Because there is a wide range in size for the firms in our sample, we use a seven-point ordinal scale to identify firm size based on the number of full-time equivalent employees. Scores ranged from one (< 5 employees) to seven (300+ employees). The mean firm size (3.49) is between three (20-49 employees) and four (50-99 employees).

Founder

Given the importance of founder effects in FFs, particularly for setting their strategy (Davis & Harveston, 1999), we included one dummy variable that identifies whether the founding generation controls the firm or not (1 = yes).

CEO characteristics

CEOs have critical influence on business strategy, such as the risk they are willing to take (Finkelstein, Hambrick, & Cannella, 2009). To account for CEO effects, we included two variables that capture the CEO's main characteristics, specifically his/her *Education* (7 levels from Below year 12 to Postgraduate) and *Tenure* (Years as CEO of the firm).

Family involvement

Because not all families have the same level of involvement in the management of the business, despite the degree of ownership, we also included two variables that capture

the family's actual involvement in the business. First, we used *CEO family status* as a dummy equal to 1 if the CEO is a family member, and 0 otherwise. Second, we computed the percentage of top executives (excluding the CEO) that are family members as an additional control variable (i.e., *Family Managers*).

Cash-out strategy

When families have the intention to exit the business, their willingness to take more disruptive strategies may be negatively affected. To account for this, we include in our analysis a dummy equal to one if the owners intended to sell a majority of the business to non-family/outside or close the business (33 cases), and zero otherwise (133 firms).

Largest stockholder

To control for differences among firms in the degree to which the largest stockholder may be involved in the setting the strategy of the FF, each respondent was asked to identify the percentage of the firm's equity held by the largest individual stockholder, using a four-point ordinal scale from one (< 25% of firm's equity) to four (over 75% of firm's equity).

Industry

Because industries differ substantially with regard to innovation, respondents were asked to identify the percentage of the business's sales revenue generated by industry sector (total of 17 sectors listed using Australia and New Zealand Industry Codes – ANZIC). A firm's primary industry was identified as the industry that accounted for the largest percentage of their sales. The 17 industry sectors were reduced to four categories (agriculture and mining, manufacturing, retailing, and services), which comprise 15, 84, 27, and 40 firms, respectively. Dummy variables were used to identify the industry category that the firm belonged to, using agriculture and mining as the base category.

Environmental hostility

Finally, we also controlled for degree of environmental uncertainty that may influence the firm's willingness to pursue more innovation and prospector strategies into new businesses. A three-item instrument developed by Khandwalla (1977) was used to measure *Environmental hostility*. For each item, respondents were asked to indicate, on a seven-point Likert scale, where the firm is positioned between two opposing statements (e.g., 1 = very safe, little threat to the survival and well-being of my firm vs. 7 = very risky, a false step can mean my firm's undoing).

Validity checks and robustness tests

Before testing the hypotheses, we investigated the possibility of non-response and common-method biases. First, we split the sample into early versus late responders, and compared their main characteristics. Firms that responded later, and presumably those that did not respond, are not different from the ones that responded earlier, except for the Cash-out control variable. Late responders had greater intention to sell the business in the future, but there is no evidence of non-response bias in the other variables. Second, we did Harman's single factor test to explore common-method bias. The largest factor accounted for 43% of the variance and the test was clearly rejected (highly significant Chi-square and a CFI of .56). Five eigenvalues greater than one accounted for 94% of the variance from the exploratory factor analysis, which provides clear evidence of variability among the variables in our study.

We also carried out confirmatory factor analysis to further investigate the validity of our four key scales: firm innovation, WC, FCG-E and FCG-NE and environmental hostility. As reported in Table 2, the model fits the data reasonably well, as indicated by the high CFI index (.973) and the RMSEA and SRMR below the .08 threshold. Within each scale, all coefficients are well above .40 and they load in the expected factor, which confirms the validity of the instruments.

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Insert Table 2 about here
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To estimate the relative impact of WC, FCG-E, and FCG-NE on the adoption of innovation strategies by family firms, we run separate models for our two dependent variables. For the analysis of firm innovation, we estimate an OLS regression of our key independent variables (WC and the two types of goals, FCG-E and FCG-NE), their interactions, and the entire set of control variables. For Miles-Snow business strategies, we run a multinomial logit model for the four categories. We report the results for the key comparison between Prospector vs. Defender strategy, also including the WC*FCG interactions and the entire set of controls. The empirical analyses and the results are presented in the following section, using robust standard errors for two-tailed tests of coefficient significance.

RESULTS

Descriptive statistics for the main variables in our study of 166 Australian FFs are reported in Table 3 and the correlations among them in Table 4. Around 39% of the FFs were controlled by the founder generation. Nearly all CEOs were family members, with only 6% of FFs having a non-family CEO. There was no evidence of multicollinearity in the correlation table, which was further confirmed by variance inflation factors lower than 3 for all independent variables in the OLS reported below.

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Insert Tables 3 and 4 about here
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Firm innovation

We run OLS regression to empirically investigate how WC and FCGs influence innovation in family firms in Table 5, which shows the results for *Firm innovation* as dependent variable. Because we want to estimate and compare the effects of different types of FCGs versus WC on firm innovation, we introduce these variables in separate steps in Models 2-5, after introducing only the control variables in Model 1. The results show that there is less firm innovation when the family member with the largest stake has more of his/her wealth invested (WC) in the family firm ($\beta = -0.13$; $p < 0.10$; Model 2), which provides marginal support for H1. Economic goals (FCG-E) show an insignificant effect on innovation ($\beta = 0.06$; $p > .10$; Model 5), thus not supporting H2. In contrast, firm innovation is greater for family firms with stronger non-economic goals (FCG-NE) ($\beta = 0.18$; $p < 0.05$; Model 5), which provides support for H3.

It should be noted that the increase in Adjusted R^2 (versus Model 1, only with the control variables) is about twice as large for FCG-NE in contrast to WC (0.031 for Model 4 vs. 0.014 for Model 2). This difference suggests that FCG-NE have more explanatory power over firm innovation than WC for the firms in our sample. Also, the increase in Adjusted R^2 of Model 6 with both variables is 0.048, which suggests that the effect of both variables seems to be virtually orthogonal to each other to a large extent, though FCG-NE becomes marginally significant in the model with the full specification. These results indicate that FCG-NE seem to be a key distinctive feature of FFs with important consequences for firm innovation.

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Insert Table 5 about here

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Regarding H4 and H5, Models 7 and 8 report the results of the interaction analysis between WC and the two types of family goals on firm innovation. We found insignificant

results for H4 ($\beta = 0.06$; $p > 0.10$; Model 7), and only marginal support for H5 ($\beta = -0.16$; $p < 0.10$; Model 8). These results suggest that the two drivers of innovation, i.e., FCGs versus WC, appear to be largely independent. However, we can still see that the explanatory power of FCG-NE is twice as large as that of FCG-E for the owning family, as shown by the increase in R^2 for Model 8 versus 7 (0.065 vs. 0.028, respectively).

Prospector vs. defender strategy

We replicate the analysis with an alternative measure of innovation strategy based on the Miles-Snow categories (Miles & Snow, 1978), which captures the FF's proactive vs. defensive strategic focus. For this analysis, we use multinomial logic to compare the log-odds of the four types of business strategy and show the results for the Prospector versus Defender strategies specifically. The Prospector vs. Defender strategies are the two key strategies at opposite ends in terms of strategic innovation for each organisation, which jointly comprise 140 of the 166 firms in the sample.

The results with this alternative measure of innovation strategies provide very similar results. Models 10 through 13 in Table 6 provide support for the significant influence of WC ($\beta = -0.40$; $p < 0.05$; Model 10). Consistent with the previous results, variable FCG-E has an insignificant coefficient ($\beta = 0.17$; $p > 0.10$; Model 13), while FCG-NE is highly significant ($\beta = 0.76$; $p < 0.01$; Model 13). Thus, we found clear support for H1 and H3, but no support for H2. Similarly, FCG-NE goals still has greater explanatory power than WC, which accounts for .041 of the variance (Model 12) while WC only contributes .017 over the explanatory power of the model (Model 10). Both effects are largely orthogonal to each other, as shown by the Δ Pseudo R^2 in Model 14 being approximately the addition of the Δ Pseudo R^2 in Models 10 and 13.

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Insert Table 6 about here
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Finally, Models 15 and 16 report the results of the interaction analysis between WC and the two types of FCGs on the choice of generic strategy. Both interactions (0.00 and -0.23 in Models 15 and 16 respectively) are insignificant, further suggesting the effects of WC and the two types of FCG have completely independent effects. Thus, we did not find support for H4 and H5.

Overall, these results are largely consistent with those reported above for the firm innovation dependent variable. Table 7 summarizes the empirical evidence for the five hypotheses using the two dependent variables.

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Insert Table 7 about here
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Robustness tests

We conducted several tests to further investigate the robustness of our results. First, we examined slightly different model specifications. Given the reduced sample size and the potential problems with statistical power, we replicated the entire analysis without the control variables. Though the coefficients obviously change, we obtained similar support for our hypotheses. We also tested for a quadratic effect of the WC variable, but it was insignificant. Using factor scores instead of aggregate values for the scales did not change our conclusions.

Second, we explored whether our results could be driven by underperformance in the firms in our sample. A key idea in the SEW literature is that FFs take riskier strategies when there is a threat of loss to their future SEW (Gomez-Mejia et al., 2011). In our empirical analysis, we control for firm performance and environmental hostility for the

industry. However, we also checked if the firms in our sample were generally performing better or worse than their competitors as this would signal future problems across the board for the firms in our sample. Only 19 of the 166 firms had a ROA lower than their main competitors so that they cannot generally be regarded as weak players with a negative outlook, which might require more innovative strategies to get out of a problematic situation. In further analyses, we computed the interactions between firm performance and our main independent variables, WC and FCG, but they were all insignificant.

DISCUSSION

While family firms are conventionally seen as more conservative than other types of organizations (De Massis et al., 2015), some family firms are among the most innovative firms in the world (Forbes, 2014). Our results confirm that there is ample heterogeneity in the amount of innovation in the strategies of FFs, which is driven by the unique features of their dominant stockholders. In contrast to prior research that generally compares family versus non-family firms, our study contributes to explain heterogeneity within family firms and its impact on innovation decisions (Chrisman & Patel, 2012).

With this study, we show the need to distinguish the family's role as an investor group (and the amount of wealth concentrated in the firm) from its unique family-centered goals (i.e., the FCG effect) to understand innovation strategies of FFs. By not doing so, that is, by using family ownership as a proxy for both WC and FCG, the impact of family involvement on firm outcomes may produce overly simplistic and possibly misleading results. For instance, the majority of empirical studies based on the SEW approach interpret the negative coefficient of family ownership on risk-taking as an indicator of family owners' resistance to ceding control, which fosters risk aversion attitudes (e.g.,

Gomez-Mejia et al., 2010). Instead, our results suggest that the adoption of innovation strategies in FFs may also be driven by the composition of the family wealth, rather than only by the importance of FCG-NE. We found clear evidence for the importance of both factors.

Our study also contributes to the connection between theoretical constructs and measures in FFs studies that follow a behavioral approach. FCG diversity was simplified by extant research that used a dichotomous classification that confronts the purely financial business goals with the "non-economic goals of family owners" (Vaquez & Rocha, 2018). Based on our findings, future studies should focus on distinguishing the FCGs that are clearly associated with FCG-E (e.g., ensuring family independence and financial security) from those which aim at benefiting the family in non-economic ways (e.g., family reputation), independently of WC considerations. Our findings confirm that once we do so, FCG-NE clearly tend to promote the adoption of riskier, more innovative strategies for the firm. Further studies should continue exploring the importance of FCG-NE, which seem to have a relatively larger effect on innovation than WC in the firm (as predicted by agency scholars) and family owners desire to keep family control (as implicit in most studies based on the SEW approach). The generally insignificant findings of our interaction effects suggest that the factors that promote innovation among family owners (FCG-NE) may be independent of economic considerations, including both economic goals aimed at benefiting the family and the composition of the family wealth portfolio.

Our findings also challenge the notion in behavioral studies that the pursuit of socioemotional utilities takes place at the expense of financial gains (Martin & Gomez-Mejia, 2016). According to SEW studies, financial and non-financial goals are only aligned when the firm is facing significant threats. Our results suggest that some family-centric priorities (i.e., the non-economic FCG) may be positively related to innovation

strategies, even when the company is not under financial distress. This contributes to create a positive perspective of SEW, "one that speaks to the core set of beliefs about the positive role and contribution of the family to the vitality of the enterprise" (Schulze & Kellermanns, 2015, p. 456).

The findings of this study also offer practical recommendations to family business owners and family advisors. Our study suggests that having most of the family wealth concentrated in a single firm is not only risky from an investor's point of view but also dangerous from a family firm owner's perspective, as it may hamper innovation in the family firm. In that regard, a potential solution for family owners to push innovation would be to open up their capital to other investors or to engage in wealth management strategies to diversify the family wealth. Moreover, the positive relationship between FCG-NE and firm innovation reinforces the need to develop strong family governance as the mechanisms to foster family cohesion and unified vision (Gersick & Feliu, 2014). This need is even stronger as the firm transition through generation since research shows that, while family emotional cohesion and identification with the firm are strong in the founder and sibling partnership stage, they are reduced in the cousin consortium and subsequent stages (Gersick, Davis, Hampton & Lansberg, 1997). If family owners want to keep the innovation drive alive, they need to ensure that the emphasis on FCG-NE is strong from generation to generation.

LIMITATIONS AND FUTURE RESEARCH

There are some limitations of our paper that deserve to be identified and discussed in some depth. First, our study is limited by the cross-sectional nature of our sample. A longitudinal study could provide further evidence on the causal relationships among the variables included. Second, we are aware of the threat of common method bias. We only have data from a questionnaire, so that the correlations that we have obtained may only

reflect what happens inside the head of the specific person that fills out the questionnaire. Still, we think this caveat may be less problematic in our context. The survey was answered by the top manager of the firm, who is most frequently the largest stockholder and a member of the owner family. This is the person that sets the strategy for the business and determines the importance of family goals for the firm, besides having the proper information to answer all the questions in our survey.

Another potential limitation of our study refers to its generalizability. We surveyed many family businesses with a reasonable response rate. However, because all the firms in our sample are completely under family control, we should be cautious when extrapolating our conclusions. For instance, using a sample of TV cable operators, Sauder et al. (2016) shows that the control embedded in firms with majority family ownership (compared to firms with minority family ownership) makes it easier to undertake risky decisions such as new technology adoption. Hence, although extant research suggest that family ownership concentration is extremely high among private firms (Fisler et al., 2018), especially among SMEs which is our research context, future research should examine the relative explanatory power of WC and FCG in firms where ownership is shared with other investors.

Moreover, we are inferring family WC effects from the largest family shareholder wealth locked in the firm. While we think that this is a reasonable assumption in our sample of 100% family-owned firms, future research may investigate the boundaries for the "family wealth" concept and the extent to which we should investigate the wealth concentration of the key family owner, often the founder, versus the rest of the family, as the driver of the firm's strategy. Though we control for the actual stake of the family member with the largest ownership in our empirical analysis, the wealth concentration of

the other family members may moderate the impact of the largest shareholder on setting the strategic direction on the family business, including its focus on innovation.

Finally, while we use two alternative measures to capture innovation strategies, innovation is a broad concept. Consequently, we encourage future research to investigate how WC and FCG affect specific measures of product and technological innovation, as well to distinguish between innovation input and outputs. While our results using the two dependent variables are fairly consistent, it seems that the results are slightly stronger and somewhat clearer to interpret when looking at the underlying strategy and skills of the FF (as captured by the Miles-Snow categories) than when looking at specific changes in firms' product markets in the previous five years. Future research should examine whether different types of innovation are uniquely affected by WC and FCG.

In conclusion, we believe that our empirical analyses contribute to the growing literature on family business, particularly regarding the strategic risk they are willing to take from a behavioral perspective. We find clear support for two of the main drivers of innovation that have been used to understand the unique features of FFs, including their investor profile and the extent to which they pursue family-centric non-economic priorities. However, these two drivers of innovation are not equally important, and ultimately, non-financial family-centered goals seem to be the main determinants of the differences in the adoption of innovative strategies that we observe across the FFs in our sample.

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TABLE 1: Summary of representative studies examining innovation strategy in family firms

Authors	Definition of Innovation	Key measures	Theory	Sample	Results
Daily and Dollinger (1992)	Miles and Snow's "Prospector" strategy	Miles and Snow's (1978) firm strategy typology	Agency theory	486 small manufacturing firms based in Indiana, USA	FFs more likely to adopt Miles & Snow's "Defender" strategy: a conservative "stick to our knitting" approach to business growth.
Morck and Stangeland (2000)	R&D Investment	R&D expenditure / sales revenue	None	246 publicly-listed firms in Canada	Founder-controlled firms invest less in innovation when benchmarked to non-founder-controlled firms of similar age, size, and industry.
Zahra (2005)	Radical product innovation	Derived measure using four 5-point Likert scale questions.	Agency theory	209 US manufacturing FFs	Long CEO tenure is negatively associated with innovation and investment in new technologies; # generations in business positively associated with innovation.
Craig and Moores (2006)	Innovation orientation	Derived measure using three 7-point Likert scale questions.	Contingency theory	67 Australian FFs	Contrary to stereotypical views of FFs, FFs were found to be highly oriented towards innovation, which persist over time.
Naldi et al. (2007)	Innovation orientation	Derived measure using three 7-point Likert scale questions with opposing statements.	Agency theory	696 Swedish SMEs (265 FFs; 431 nonFFs)	FFs undertake risks to a lesser extent compared to nonFFs. Significant positive association between risk-taking and innovativeness in FFs.
Short et al. (2009)	Innovation orientation	Content analysis of publicly available company documents (e.g. annual reports) searching for 86 words associated with innovativeness	None	426 S&P 500 companies (146 FFs; 280 nonFFs)	No significant difference was found between company documents of FFs and NonFFs in the use of language indicating innovativeness.

Casillas et al, (2010)	Innovation orientation	Derived measure using four 7-point Likert scale questions with opposing statements.	None	449 Spanish SMEs	The level of family involvement increased the intensity of the influence of innovativeness on firm growth.
Muñoz-Bullón and Sanchez-Bueno (2011)	R&D Investment	R&D expenditure / sales revenue	Agency theory	736 publicly-traded Canadian firms	FFs recorded a significantly lower R&D intensity when compared to nonFFs.
Anderson et al. (2012)	R&D Investment	R&D expense / total investment expenditure	Agency theory	2,000 largest non-financial, non-utility publicly-traded US firms	Compared to nonFFs, FFs committed significantly less capital to R&D investments. FFs receive fewer patents per R&D dollar and patent citations per R&D dollar when compared to nonFFs. Differences are attributed to the lower risk-taking propensity of FFs.
Kellermanns et al. (2012)	Innovation orientation	Derived measure using two 7-point Likert scale questions with opposing statements.	Agency theory	70 FFs based in the USA	Superior levels of performance were achieved from innovation when ownership was concentrated within one generation, while performance declined as ownership became more dispersed across generations.
Block et al. (2013)	Innovation output	# of patent citations	Behavioural agency (SEW)	248 firms listed on the S&P 500	FFs received fewer patent citations compared with other firms even when controlling for R&D spending. Authors argue SEW concerns may bias FFs toward incremental rather than radical innovation projects.
Liang et al. (2013)	Innovation input (R&D Investment) and innovation output	Innovation input (R&D expenditure / sales revenue); innovation output (annual # of patents).	Agency theory / resource-based theory	102 listed FFs in China	Family involvement in boards strengthened the positive relationship between R&D investment and innovation performance, whereas family involvement in management teams weakened this positive relationship.
Craig et al. (2014)	Innovation output	% of total revenue generated from new products	None	532 Finnish firms	Unlike with nonFFs, risk-taking was not found to effect innovation output of FFs. Proactiveness had a greater effect on innovation output compared to nonFFs.

Gomez-Mejia et al. (2014)	R&D Investment	R&D expenditure / sales revenue	Behavioural agency (SEW)	610 high-tech publicly-traded US firms	FFs are less prone to invest in R&D compared to nonFFs. Performance hazard was found to amplify the positive effect of related diversification on R&D investment in FFs.
Patel and Chrisman (2014)	R&D Investment	Natural log of R&D expenditure	Behavioural agency (SEW)	847 manufacturing firms listed in the S&P 1500 index (426 FFs; 421 nonFFs)	FFs invest in R&D in different ways to nonFFs. When FF performance is below (above) expectations, they are more likely undertake conservative (risky) R&D investments.
Kammerlander, Dessi, Bird, Floris & Murru (2015)	The implementation of new idea, practice, or object.	Statements that referred to product, process or marketing innovations.	Grounded theory	41 Sardinian-based family wineries	The strength of founder focus is negatively and the strength of family focus is positively related to innovation, and that those relationships are mediated by the scope of decision-making options, the distribution of decision-making power between generations, and the role of conflict in the respective families
Kraiczky et al. (2015)	New product portfolio innovativeness	Derived measure using six Likert scale questions	Behavioural agency (SEW)	114 German SME manufacturers	CEO propensity for risk-taking positively influences orientation towards innovation in the firm. However, (i) high levels of ownership by TMT family members (higher SEW) and (ii) succession to later generations (lower SEW) both significantly weaken the relationship between risk-taking and innovation.
Nieto et al. (2015)	Innovation input, innovation source and innovation type	Innovation input (R&D expenditure / sales revenue); innovation source (contracting vs. collaboration) and innovation type (incremental vs. radical)	Agency theory	5,173 firm-year observations of Spanish manufacturing firms	FFs exhibit lower levels of R&D intensity, are less likely to collaborate with others to innovate and are less likely to achieve radical innovations when compared to nonFFs.
Sciascia et al. (2015)	R&D Investment	R&D intensity	Behavioural agency (SEW)	240 Italian SMEs	When an SME is mostly owned by a family, its expenditure on R&D decreases as the % of the family's personal wealth tied up in the business increases.

De Massis et al. (2016)	Innovation output	% of annual growth rate attributed to new products	Grounded theory	6 family SMEs	Product innovation performance of family SMEs depends on how well the design of NPD programs fits their governance attributes. This fit depends on dimensions of NPD design such as organization of NPD teams, separation of leadership and championing roles, and application of intrinsic incentives in place of extrinsic incentives to foster teamwork and achieve stronger goal alignment.
Duran et al. (2016)	Innovation input (R&D Investment) and innovation output	Innovation input most commonly measured using some measure of R&D intensity. Innovation output commonly measured in terms of new products and patents.	Behavioural agency (SEW) & resource-based theory	Meta-analysis based on 108 primary studies from 42 countries	FFs invest less in innovation (input) but have an increased conversion rate of innovation input into innovation output when compared to nonFFs. Findings are attributed to the family's high level of control over the firm, wealth concentration, and importance of non-financial goals.
Meroño-Cerdán et al. (2018)	Innovation orientation	Derived measure using four 7-point Likert scale questions with opposing statements.	Behavioural agency (SEW)	499 unlisted Spanish SMEs	Unlike with nonFFs, risk aversion does not have a direct effect on firm performance. Rather risk aversion positively influences the orientation towards innovation and consequently performance of the firm.
Kosmidou and Ahuja (2019)	Innovation orientation	Derived measure using four 7-point Likert scale questions with opposing statements.	Behavioural agency (SEW)	277 privately-owned US FFs	A lack of non-family managers led to increased innovation when FFs attached high importance to SEW. FF innovation was high (low) when external SEW was important (not important) for the owning family and internal SEW was not (was).

TABLE 2: Confirmatory factor analysis

Items for each scale	
<p>The items were aggregated to compute the value for each scale (i.e., <i>tau</i> equivalent). Each loading is shown in parentheses after the items below. Fit indexes for the confirmatory factor analysis: Chi2(48 d.f.) = 62.112 (p = .08) CFI = .973 RMSEA = .042 SRMR = .057</p>	
Firm innovation	<p>Attitude towards innovation was based on the three-question instrument developed by Covin and Slevin (1989), widely used for measuring the innovation dimension of EO (Lumpkin et al., 2009). Items:</p> <p>1.- In general, the top managers of my firm favour a strong emphasis on: The marketing of tried-and-true products or services vs R&D, technological leadership, and innovations (.47)</p> <p>2.- How many new lines of products or services has your firm marketed in the past 5 years? No new lines of products and services vs Many new lines of products and services (.71)</p> <p>3.- Changes in products or service lines have... Been mostly of a minor nature vs Usually been quite dramatic (.98)</p>
Family-centered Goals (FCG)	<p>Based on previous research on family goals (Basco, 2013; Holt et al., 2017; Kotlar & De Massis, 2013; Sorenson, 1999, 2000), we developed six items using a 5-point Likert scale (1 = not important at all to 5 extremely important) to assess the importance of different FCG (economic and non-economic) to the owning family. The two scales were then used in the empirical analysis.</p> <p><i>Items for the economic goals scale (FCG-E):</i></p> <p>1. Increasing family wealth (.60) 2. Financial security for the family (.72) 3. Family independence/control (.53)</p> <p><i>Items for the non-economic goals scale (FCG-NE):</i></p> <p>1. Family cohesiveness, supportiveness and loyalty (.76) 2. Family name recognition and respect in the community (.45) 3. Unifying vision for the business and the family (.67)</p>
Environmental hostility	<p>Environmental hostility was measured using the 3-question instrument developed by Khandwalla (1977). The questions use a 7-point semantic differential of two opposed statements. Items:</p> <p>- How would you characterise the environment of your firm's primary industry?</p> <p>1.- An environment that my firm can control to its own advantage vs. A dominating environment in which my firm's initiatives count very little (.70)</p> <p>2.- Very safe, little threat to the survival and well-being of my firm vs. Very risky, a false step can mean my firm's undoing (.84)</p> <p>3.- Rich in investment and marketing opportunities vs. Very stressful, hostile; very hard to keep afloat (.81)</p>

TABLE 3: Descriptive statistics

	Mean	St. Dev.	Minimum	Maximum
Firm performance	3.13	1.30	0.00	7.00
Family managers	0.34	0.36	0.00	1.00
Founder	0.39	0.49	0.00	1.00
CEO education	4.92	2.10	1.00	7.00
CEO tenure	17.27	11.83	1.00	45.00
CEO non-family	0.06	0.24	0.00	1.00
Firm size	3.49	1.66	1.00	7.00
Cash-out strategy	0.19	0.40	0.00	1.00
Largest stockholder	2.87	1.09	0.00	4.00
Environmental hostility	4.24	1.22	1.00	7.00
Firm innovation	30.66	7.28	9.00	49.00
Wealth concentration	2.72	1.05	1.00	4.00
FCG-E	5.35	1.76	3.00	12.00
FCG-NE	6.40	2.31	3.00	15.00
N	166			

TABLE 4: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Firm performance													
2. Family managers	.02												
3. Founder	.03	.04											
4. CEO education	.06	.05	.17*										
5. CEO tenure	.05	.06	.34**	.19*									
6. CEO non-family	.04	.05	.20**	.15*	.19*								
7. Firm size	.00	.17*	.18*	.11	.02	.19*							
8. Cash-out strategy	.15*	.05	.14+	.03	.11	.06	.09						
9. Largest stockholder	.13+	.10	.21**	.09	.18*	.05	.17*	.10					
10. Environmental hostility	.45**	.02	.01	.05	.01	.02	.03	.12	.04				
11. Firm innovation	.04	.10	.09	.07	.12	.01	.09	.05	.01	.07			
12. Wealth concentration	.07	.18*	.15*	.07	.15*	.03	.15+	.06	.14+	.10	.12		
13. FCG-E	.14+	.07	.06	.06	.19*	.04	.02	.08	.05	.09	.10	.04	
14. FCG-NE	.12	.16*	.17*	.04	.21**	.02	.05	.29**	.24**	.00	.14+	.08	.32**

N= 166. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

TABLE 5: OLS regressions of innovation*Dependent variable: firm innovation*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Firm performance	-0.07	-0.07	-0.06	-0.05	-0.04	-0.05	-0.06	-0.02
Family managers	-0.10	-0.12	-0.11	-0.13+	-0.13+	-0.15+	-0.12	-0.17*
Founder	0.11	0.12	0.09	0.12	0.11	0.12	0.11	0.12
CEO education	0.11	0.10	0.12	0.11	0.11	0.10	0.11	0.09
CEO tenure	0.11	0.13+	0.14+	0.15+	0.16+	0.18*	0.15+	0.15+
CEO non-family	-0.00	-0.01	-0.01	0.01	0.01	0.00	-0.02	0.01
Firm size	0.02	0.05	0.02	0.02	0.02	0.05	0.05	0.06
Cash-out strategy	0.03	0.01	0.03	0.07	0.07	0.06	0.02	0.06
Largest stockholder	0.04	0.05	0.04	0.06	0.06	0.07	0.05	0.09
Environmental hostility	0.08	0.10	0.09	0.07	0.07	0.09	0.10	0.06
Services industry	-0.25+	-0.22	-0.26+	-0.26+	-0.27*	-0.24+	-0.23	-0.24+
Manufacturing industry	0.10	0.10	0.08	0.07	0.06	0.06	0.08	0.04
Retailing industry	0.03	0.03	0.01	-0.00	-0.01	-0.02	0.00	-0.03
Wealth concentration (WC)		-0.13+				-0.13+	-0.13+	-0.13+
FCG-E			0.11		0.06	0.07	0.11	
FCG-NE				0.20*	0.18*	0.18+		0.26**
WC*FCG-E							0.06	
WC*FCG-NE								-0.16+
R ²	0.147	0.161	0.158	0.178	0.182	0.195	0.175	0.212
ΔR^2 (vs. Model 1)		0.014	0.011	0.031	0.035	0.048	0.028	0.065
F test (ΔR^2)		2.49	1.95	5.80*	3.19*	3.00*	1.71	4.08**

N= 166. + p < 0.10, * p < 0.05, ** p < 0.01. Standardized beta coefficients reported. Robust standard errors used for testing coefficient significance.

TABLE 6: Multinomial logit regression of Miles-Snow categories*Dependent variable: log-odds of prospector over defender strategy*

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Constant	-0.87	-1.39	-1.06	-1.25	-1.32	-1.97	-1.60	-1.87
Firm performance	0.02	0.02	0.05	0.08	0.09	0.09	0.06	0.11
Family managers	-0.20	-0.36	-0.28	-0.55	-0.58	-0.83	-0.47	-0.85
Founder	1.41**	1.53**	1.33**	1.59**	1.55**	1.74**	1.47**	1.73**
CEO education	0.15+	0.15	0.17+	0.17+	0.18+	0.18+	0.17+	0.16
CEO tenure	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
CEO non-family	0.00	-0.03	-0.08	0.18	0.13	0.15	-0.10	0.23
Firm size	-0.01	0.05	0.01	-0.02	-0.01	0.05	0.06	0.05
Cash-out strategy	-0.19	-0.32	-0.16	0.31	0.30	0.16	-0.32	0.19
Largest stockholder	-0.09	-0.06	-0.09	0.00	-0.00	0.04	-0.06	0.08
Environmental hostility	0.05	0.06	0.05	0.04	0.04	0.05	0.06	0.04
Services industry	-1.00	-0.86	-1.12+	-1.18+	-1.22+	-1.08	-1.00	-1.04
Manufacturing industry	0.35	0.33	0.21	0.04	-0.01	-0.07	0.17	-0.08
Retailing industry	-0.42	-0.48	-0.59	-0.67	-0.73	-0.81	-0.69	-0.75
Wealth concentration (WC)		-0.40*				-0.47*	-0.43*	-0.45*
FCG-E			0.36+		0.17	0.19	0.39+	
FCG-NE				0.81**	0.76**	0.80**		0.91**
WC*FCG-E							0.00	
WC*FCG-NE								-0.23
Pseudo R ²	0.139	0.156	0.154	0.180	0.186	0.206	0.175	0.210
Δ Pseudo R ² (vs. Model 9)		0.017	0.015	0.041	0.047	0.067	0.036	0.071
Chi2 test (Δ LogLikelihood)		6.12	5.30	15.12**	17.48**	25.06**	13.41	26.61**

N= 166. + p < 0.10, * p < 0.05, ** p < 0.01. Robust standard errors used for testing coefficient significance.

TABLE 7: Summary of results

		Firm Innovation	Prospector vs. defender strategy
H1	There is a negative association between the adoption of innovation strategies by family firms and the family owner's personal wealth invested in the business.	Marginally supported	Supported
H2	There is a negative association between the adoption of innovation strategies by family firms and the importance of FCG-E.	Not supported	Not supported
H3	There is a positive association between the adoption of innovation strategies by family firms and the importance of FCG-NE.	Supported	Supported
H4	The negative association between the adoption of innovation strategies by family firms and the importance of economic family-centered goals (FCG-E) in the business will be greater for firms with higher WC.	Not supported	Not supported
H5	The positive association between the adoption of innovation strategies by family firms and the importance of non-economic family-centered goals (FCG-NE) in the business will be smaller for firms with higher WC.	Marginally supported	Not supported