

Research and innovation and the role of competition in family owned and managed firms

Innovation in family owned and managed firms

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Abstract

Purpose – This paper examines the innovation behavior of family-owned firms versus non-family-owned firms. The role of internal family governance and the influence of external stimuli (competition) on innovation are also considered.

Design/methodology/approach – The data of 20,995 family and non-family firms across 38 countries are derived from the World Bank Enterprise Survey during the period 2019–2020. Probit models are used to examine the impact of family ownership, family governance, and competition on innovation outcomes.

Findings – Family firms are more likely to make R&D investments, acquire external knowledge, engage in product innovation (including innovations that are new to the market) and process innovation, relative to non-family firms. However, a high propensity of family member involvement in top management positions can reduce innovation. Competition has a negative impact on innovation outcomes for both family and non-family firms, but it has a positive moderating effect on the innovation activities of family firms where a higher level of family member involvement in management is present.

Originality/value – This paper provides novel insights into family firm innovation dynamics by identifying family firms as more innovative than non-family firms for all types of indicators, debunking the idea that family firms are conservative, reluctant to change, and averse to the risks in innovation activities. However, too much family involvement in decision making may stifle some innovation activities in family firms, except in cases where the operating environment is highly competitive; this provides new insights into the ownership-management dynamic of family firms.

Keywords Family firms, Family management, Innovation, Competition

Paper type Research paper

1. Introduction

Innovation is crucial to the survival of enterprises in competitive markets (Caves, 1998). It enables companies to explore new markets, increase market share, and establish a good reputation (Ireland *et al.*, 2002; Knight and Cavusgil, 2004; Baker and Sinkula, 2005; Pisano, 2015). This is also the case for family firms, where innovation is needed for survival and growth (Kellermanns *et al.*, 2010). However, family firms have traditionally

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been characterized as conservative, reluctant to change, and risk averse, which has led researchers to hypothesize that they will, relative to non-family firms, engage in lower levels of research and innovation (Chen and Hsu, 2009; Nieto *et al.*, 2015). If true, the implications are bleak for global economic development. In 2014 it was estimated that around 65–80% of global enterprises are owned or operated by families, accounting for 70–90% of global GDP (Family Firm Institute, 2014; Guo *et al.*, 2021) and 50–80% of jobs in most countries around the world (Alon *et al.*, 2020).

Family firms usually serve the dual objectives of creating economic efficiency whilst preserving family social interests. This duality adds complexity to the decision-making process around family firms' innovative behaviors (Astrachan and Jaskiewicz, 2008). Specifically, family firms not only pursue financial and market success, but also attempt to retain intrafamily relatedness by engaging family members in business management (Gómez-Mejía *et al.*, 2007).

This paper adds to the body of knowledge on family firm innovation in three ways. The first contribution stems from the breadth of the research and the innovation indicators examined within this paper, which together offer a more comprehensive picture of family firm innovation. In prior studies, most scholars have adopted a single index to measure the innovative behavior of family firms. For example, Nieto *et al.* (2015), López-Fernández *et al.* (2016), and Schäfer *et al.* (2017) measure innovation decisions as intensity of R&D investment and patents. Other scholars use external technology acquisition to measure innovation inputs, and product innovation to measure outputs (Classen *et al.*, 2012; Ashwin *et al.*, 2015; Minetti *et al.*, 2015; Mazzelli *et al.*, 2018). A number of papers (De Massis *et al.*, 2015a; Hernández-Perlines *et al.*, 2020; Calabrò *et al.*, 2018; Westhead and Howorth, 2006) encourage future scholars to consider the heterogeneity of innovation activities in the context of family firms, with De Massis *et al.* (2015a, pp. 6–7) highlighting that “the role of family involvement has only scarcely been understood” and Hernández-Perlines *et al.* (2020, p. 3) noting the “contradictory evidence” in the literature on the role of innovation for family firms. This study directly addresses this call for further research by considering the impact of family ownership on six different indicators of family firms' innovation behavior. These indicators are: (1) internal R&D expenditure, (2) external R&D expenditure, (3) external knowledge acquisition, (4) new to firm (NtF) product innovation, (5) new to market (NtM) product innovation, and (6) process innovation. This allows us to build on existing literature by providing a more thorough examination of the degree to which family firms engage in a diverse range of innovation activities relative to non-family firms.

The second contribution focuses on the internal governance of family firms, specifically the share of family members to non-family members in senior management positions. We consider how this might affect the innovation outcomes of family firms. Under the framework of internal governance, family participation in senior management teams provides family members with greater freedom, enhancing their ability to influence the orientation of innovative activities in the family business (Kraiczy *et al.*, 2014). The bulk of the existing literature focuses on the direct link between family management and innovation input or output (Manzaneque *et al.*, 2017, 2018; Cucculelli *et al.*, 2016). However, the proportion of family members in senior management positions and its impact on innovation outcomes have largely been ignored (Calabrò *et al.*, 2018). Furthermore, the exploration of internal governance, particularly studies examining the family management-innovation nexus, has focused on a narrow scope of innovation activities in family firms (i.e. only product innovation) (Migliori *et al.*, 2020). Dieguez-Soto and Martínez-Romero (2019) suggest that future research should not only explore the degree to which the occupation of management positions by family (versus non-family) members matters for innovation, but also consider if it matters across a wider array of innovation activities. This paper addresses this call, as it

investigates the relationship between the percentage of family members in key managerial positions and its impact on the different research and innovation activities of family firms.

The third contribution specifically focuses on the influence of external stimuli in driving family firm innovation. It does so by triangulating literature from the fields of competition, innovation, and family firms. Since most SMEs operate in a competitive environment, another way for businesses to innovate in the marketplace is by competing with their external rivals (Dutz *et al.*, 2011). Many previous studies have identified the impact of external forces on firm innovation and performance (Aghion *et al.*, 2005; Tingvall and Karpaty, 2011; Crowley and Jordan, 2017). However, Park *et al.* (2019, p. 5) highlight that “there is a paucity of empirical studies on the nature of the high-velocity environment or on how family firms respond to changes in the economic environment and whether such changes drive innovation in family firms”. This research aims to shed light on this matter by examining what role competition plays in driving innovation outcomes for family firms relative to non-family firms.

This paper incorporates a cross-country and cross-continent analysis using World Bank Enterprise Survey data from 20,995 family and non-family businesses in 38 countries in Eastern and Central Europe and East Asia, covering the years 2019–2020. This allows us to extend existing literature by providing a cross-country, cross-continent contribution. A series of probit models are estimated, which allows us to identify the differences in innovation behavior between family firms and non-family firms, as well as the impact of family management and competition on innovation.

The remainder of this paper is structured as follows. Section 2 reviews the existing literature and outlines the hypotheses to be examined. Section 3 provides an overview of the data as well as detailing the empirical methodology utilized. The empirical findings are discussed in Section 4. Section 5 includes a discussion of the results while Section 6 concludes the paper.

2. Literature review

2.1 *The role of familiness for family firm research and innovation*

In the resource-based view (RBV) (Wernerfelt, 1984), an enterprise is regarded as a pool of both tangible and intangible resources. The success of a company largely depends on the resources it owns and controls (Galbreath, 2005). Only unique, rare, inimitable, and irreplaceably intangible resources can generate and preserve competitive advantages, and thus drive superior firm performance (Michalisin *et al.*, 1997). The RBV of the firm predicts that enterprises can generate specific competitive advantages through innovation (Barney, 1991; Greve, 2009). The knowledge-based perspective, as a branch of RBV, regards the ability to collect and distribute the knowledge of a company as the origin of innovation (Zahra *et al.*, 2007). Due to the systematic interaction between family members and the firm, familiness is believed to be a collection of the resources that exist in family firms (Habbershon and Williams, 1999). According to the RBV, a major factor that determines the knowledge base and strategic capabilities of family firms is their internal and external social capital (De Massis *et al.*, 2015b; Hoffmann *et al.*, 2015).

Individual and group ties within a collective, particularly relationships that contribute to cohesion and promote collective activity, are the focus of internal social capital (Acquaah, 2011; Adler and Kwon, 2002). In family firms, the deep and persistent links between most family members, as well as their shared collective goals, foster an ideal setting in which social capital conditions can be optimized (Coleman, 1988; Acquaah, 2011). This social capital acts as a channeling mechanism for knowledge flow and exchange, promoting the development of existing knowledge (Alguezaui and Filieri, 2010). Thus, the social capital within family firms constitutes strategic resources that are available for innovation when exchanging and sharing knowledge (Acquaah, 2011).

External social capital includes intra-industry and extra-industry relationships, which allow enterprises to acquire new and diversified knowledge from the external environment, thus providing a platform for knowledge sharing among companies (Ortiz *et al.*, 2018). Enterprises seeking new ideas externally may engage with universities, research centers, and suppliers with necessary knowledge; this engagement will promote the combination of heterogeneous knowledge and cultivate the innovation ability of enterprises (Moran, 2005; Corral de Zubielqui *et al.*, 2015; Singh *et al.*, 2021). A firm's exposure to the external environment determines its ability to use external social capital to acquire knowledge (Simao and Franco, 2018). However, in family firms, especially those with a high proportion of family members, the ability to acquire knowledge can be weak (Donckels and Fröhlich, 1991). The reason for this is that family firms place a larger premium on creating good internal relationships to protect social emotional wealth (SEW). They will tend to focus on identity, family influence, and the continuation of the family dynasty (Gomez-Mejia *et al.*, 2011). Fear of knowledge spillovers and loss of control over strategic decisions through the acquisition of external knowledge may incline family business owners to reduce their level of external cooperation, which in turn affects their ability to acquire knowledge (De Massis *et al.*, 2015a).

In general, family firms are frequently thought of as enterprises with a high level of intensive social interaction, and the innovation strategies they develop are likely to depend on the specificity of the resources they possess (Salvato and Melin, 2008). Unlike the profit-focused strategic objectives of non-family firms, family firms can have objectives that are related to the family's social interest. Thus, the families have an impact on their enterprises and innovative activities as they seek to protect those family social interests through a complex combination of social interaction, network ties, company values, culture, and heritage (Kansikas and Nemilentsev, 2010; Cassia *et al.*, 2011). It is the existence of heterogeneity in the innovation phenomena of family versus non-family firms (Hu and Hughes, 2020) that makes it necessary to understand in more detail the particularity of various kinds of innovation activities in family firms.

2.2 R&D investment and knowledge sourcing in family firms

2.2.1 R&D and family firms.

According to agency theory, the unification of ownership and management in a family business leads to innovative activities and risk preferences related to the firm's ownership and governance (Sciascia *et al.*, 2015). Family owners and family members invest most of their wealth in their companies, so their wealth is related to enterprise value (Hoffmann *et al.*, 2015). When an investment fails, they bear all the financial risk of its failure, and consequently family firms are more conservative than non-family firms, tending to avoid risk-related decisions, such as investing resources in R&D (Schulze *et al.*, 2002). R&D investments are characterized by a high probability of failure and unpredictable returns, and family firms will not support investments that do not guarantee financial success (Luo *et al.*, 2021). The existing evidence shows that family firms prefer to invest in real assets rather than in high-risk research and development projects (Anderson *et al.*, 2012). To preserve SEW, family firms invest less in R&D than other firms (Asaba and Wada, 2019; Min, 2021). This leads to the first hypothesis:

H1. Family firms are less likely to undertake R&D relative to non-family firms.

2.2.2 External knowledge and family firms.

Although internal procurement is relevant to the process of innovation, external sources of knowledge can also be explored through outsourcing, corporate acquisition, or technical cooperation (Cockburn and Henderson, 1998; Cassiman and Veugelers, 1999; Rigby and Zook, 2002). The decision of a company to participate in external knowledge acquisition is influenced by the decision maker's behavioral characteristics (Classen *et al.*, 2012). Decision makers in family firms are primarily concerned with the non-economic objective of protecting the family by controlling

the business and thus maintaining family nepotism (Arregle *et al.*, 2015; Gomez-Mejia *et al.*, 2007). Internal innovation has the benefit of limiting information and knowledge leakage while also lowering coordination issues (Oxley and Sampson, 2004). Even though family firms need to invest more resources to maintain control over internal innovation activities, their decision makers' desire for corporate control creates an unwillingness to focus on external innovation activities (Gallo, 2004; Zellweger, 2017). Because of the risk of knowledge spillovers, family firms may view external procurement as a potential threat to competitive advantage, thus preventing them from choosing external collaboration for innovative decisions (Serrano-Bedia *et al.*, 2016). Zhao *et al.* (2020) suggest that external collaboration based on partial relinquishment of control and adjustment of organizational practices will undoubtedly cause a huge loss of SEW to the family enterprises that prioritize family control and influence.

The empirical evidence indicates that family firms are less likely to use external sources of knowledge. Nieto *et al.* (2015), using Spanish data, report that family firms are less likely to rely on external resources, especially technical cooperation and contract mechanisms. Similarly, family SMEs employ fewer diversified partners in securing innovation-related resources, according to data from SMEs in Belgium and the Netherlands (Classen *et al.*, 2012). Finally, other studies show that compared with non-family enterprises, family firms are less likely to acquire external technologies (Kotlar *et al.*, 2013; Nieto *et al.*, 2015). Based on the above discussion, this leads us to propose the second hypothesis:

- H2. Family firms are less likely to use external sources of knowledge relative to non-family firms.

2.3 Family firm innovation outputs

Existing literature highlights that family ownership also impacts firms' innovation output behavior (Carney, 2005; Carnes and Ireland, 2013; Chrisman *et al.*, 2015b). However, despite the theoretical view and current empirical evidence indicating that family firms (relative to non-family firms) are less likely to have innovation inputs, the same cannot be said for innovation outputs. Existing research shows that despite investing less in innovation, family firms have a greater productive capacity to do more (innovation outputs) with less (innovation inputs) (Duran *et al.*, 2016). This is also apparent from other studies, where family firms are more innovative than non-family firms (Gudmundson *et al.*, 2003; Llach and Nordqvist, 2010).

Relative to non-family firms, family firms have special organizational flexibility, which makes it easier for them to communicate and make decisions faster (Lubatkin *et al.*, 2007; Hatum and Pettigrew, 2004). They will adopt a more flexible attitude to focus on the non-economic and long-term goals of the firm when they think the innovation decisions are in their long-term interests (De Massis *et al.*, 2015b). This special organizational flexibility of family firms allows "employees" to switch between innovative business and normal business at will, compared to non-family firms (Chrisman *et al.*, 2015a). This "employee" switching further enables family firms to achieve significant cost savings, allowing them to tailor their innovation processes to the characteristics of the firm (De Massis *et al.*, 2016).

Matzler *et al.* (2015) find that family firms launch more new products than non-family firms. Similarly, Classen *et al.* (2014), employing data from German SMEs, argue that family firms perform better than non-family enterprises at realizing product innovation. A study based on a sample of 2,604 firms in the Flanders Community Survey confirms that the flexible internal and external organization of family firms creates more successful process innovation (Broekaert *et al.*, 2016). Németh and Dóry (2019) report that family firms show higher performance in service process innovation than non-family enterprises in their study in Hungary. Thus, the third hypothesis is as follows:

H3. Family firms are more likely to engage in product and process innovation relative to non-family firms.

However, the degree of radicalness of the innovation activities of family firms is questionable. Family firms have been found to invest less in innovation and to choose incremental innovation strategies over radical ones (De Massis *et al.*, 2015b). This is reinforced by König *et al.* (2013) and Nieto *et al.* (2015) who theorize that the production of radical innovations is hindered by family involvement. This is because the unique characteristics of family businesses, such as a conservative attitude, make them more attentive to the stable and continuous operation of the enterprise by maintaining the status quo. They may therefore be reluctant to introduce disruptive innovations that may produce results that are beyond their control (Chrisman *et al.*, 2015a). This leads to the following hypothesis:

H4. Family firms are more likely to engage in incremental innovation (new to firm) and less likely to engage in radical innovation (new to market) relative to non-family firms.

2.4 Internal governance, external stimuli and innovation in family firms

2.4.1 Family management and innovation. The internal governance of family-owned firms and the degree of family involvement in management can also impact the firm's likelihood of innovation (Purkayastha *et al.*, 2019). Family ownership is the extent to which family members, or their foundations/trusts, hold equity or voting rights in a business. Family management control is the degree to which family members have influence over managerial positions (Frank *et al.*, 2019). The main implication of the family management scenario is that the main resources in the firm are controlled by family members and thus actions aimed at family continuity can occur, such as appointing family members to lead the company rather than hiring professional managers from outside (Holt *et al.*, 2017). Family-owned but professionally managed firms adhere more closely to the economic goal of achieving higher profits (Nason *et al.*, 2019). To date, most literature focuses on the relationship between family ownership and innovation performance, with much less attention being paid to the role of internal governance, particularly the role of family management on innovation outcomes (Matzler *et al.*, 2015; Diéguez-Soto *et al.*, 2018).

As a form of internal governance, family members' involvement in top management teams (TMT) will have an impact on the company's innovation orientation and on TMT intention to participate in innovative activities (Talke *et al.*, 2011). Agency theory indicates that family members want to keep control of the business, so they pay special attention to the internal financial situation of the business (Sharma, 2004). This is because their assets overlap with the value of the company, and the greater the overlap, the more the family management will restrict the use of financial resources, especially for risky innovative strategic investments (Astrachan and Jaskiewicz, 2008; Filser *et al.*, 2016). The higher the number of family members in the TMT, the more detrimental impact the TMT's orientation has on innovative activities (Kraiczy *et al.*, 2014). The reason for this is that TMT with a large proportion of family membership may lead to a deficiency in the knowledge and social resources that external non-family members can offer. Therefore, it can lead to a lack of diversity and poor innovation decision making (Sirmon and Hitt, 2003).

Liang *et al.* (2013) show that family involvement in the management team inhibits the positive relationship between R&D investment and innovation performance. Using a sample of large German listed companies from 2000 to 2009, Matzler *et al.* (2015) find that family members' participation in the board of directors and management team has a negative impact on enterprise R&D investment. Similarly, Migliori *et al.* (2020), based on data from 1,093 Italian family SMEs in Italy, finds that family management has a negative impact on the

innovation tendency of family enterprises. Therefore, based on the discussion of the above literature, the fifth hypothesis is:

H5. Firms with a higher degree of family management will have lower levels of research and innovation activities.

2.4.2 The impact of external stimuli (competition) on innovation in family firms. Schumpeter's (1942) view of market power and innovation suggests that the external environment and the degree of competition has a strong influence on innovation outcomes. The debate about the relationship between competition and innovation originated from Schumpeter's view of market forces and innovation, where a certain degree of competition is conducive to innovation (Schumpeter *et al.*, 1934). In other words, competition forces enterprises to innovate to survive (Ahn, 2002; Park *et al.*, 2019). Aghion *et al.* (1999) believe that to avoid losing control due to bankruptcy, external rivalry in product marketplaces may compel managers to accelerate the adoption of new technology. Based on the theory of population ecology, the existence and growth of a firm (whether family-owned or non-family-owned) are tied to its legitimacy and capacity to execute its mission under external stimuli (Hannan and Carroll, 1992; Hannan and Freeman, 1988).

The interdependency between competition and innovation continues to be a topic of discussion in the literature. Earlier studies find a positive linear effect between competition and innovation (Mukhopadhyay, 1985; Nickell, 1996; Blundell *et al.*, 1999). However, more recent studies have identified a non-linear relationship between competition and innovation; for example, Aghion *et al.*'s (2005) inverted U-shape relationship. Furthermore, Aghion *et al.* (2005, p. 719) believe that competition can increase incremental profits from innovation in what they refer to as "neck and neck" industries (i.e. oligopolistic firms experiencing similar production costs), thus encouraging R&D investment to evade competitive effects. Tingvall and Karpaty (2011), using panel data to study firms in the Swedish service industry, report an inverted U-shaped relationship between service competition and R&D, although non-export enterprises did not have such a relationship. Similarly, Crowley and Jordan (2017) provide evidence of a "tipping point" effect in domestically focused firms, where some low or moderate levels of competition promote innovation at the business level, even though fierce competition has been linked to less innovation.

External rivalry is hypothesized to be an important learning system for family firm innovation (Park *et al.*, 2019). However, empirical analysis on the competition-innovation nexus in family firms is extremely limited (Westhead and Howorth, 2006; Park *et al.*, 2019). Chen *et al.* (2017) discover that family managers who focus too much on family goals feel insecure, especially when operating in a highly competitive industry. The authors assert that family businesses must abandon their defensive characteristics and negative perceptions of the external environment, and pursue economic goals that are in the interests of the company (Chen *et al.*, 2017). In such a case, the inhibiting effect of family control on enterprise innovation activities is elevated (Classen *et al.*, 2012, 2014). Empirically, Jiang (2017) indicates that when family enterprises face fierce industrial competition, enterprises that have higher levels of family involvement in management experience lower returns from R&D activities. Thus, the following hypothesis is proposed:

H6. The research and innovation activities of family-owned and -managed firms are more likely to be impacted negatively by increased competition relative to non-family firms.

2.5 A summary of the research model and hypotheses

We conclude from the literature review that family firms are characterized as having higher levels of SEW. Consequently, they are prone to behaviors that are relatively conservative,

risk averse, and reluctant to change. For **H1** and **H2**, we hypothesize that these characteristics impede family firms' investment in R&D (**H1**) and cause them to eschew external sources of knowledge (**H2**) relative to their non-family-owned counterparts. In contrast, the literature indicates that family firms are more efficient in converting innovative inputs into more innovative outputs. Consequently, we hypothesize in **H3** that family firms will be more likely to engage in product and process innovation. However, the conservative attitude of family firms makes them more concerned with the stability and continued operation of the firm rather than with introducing innovations that are likely to be disruptive. Thus, we also hypothesize that family firms are more likely to engage in incremental innovation (new to firm), and less likely to engage in radical innovation (new to market), relative to non-family firms (**H4**).

These hypotheses are summarized in the conceptualization presented in **Figure 1** below. The overlap of the two dashed boxes reflects that, in the internal governance of family firms, increased family involvement leads to an increase in their conservative behaviors. The higher the proportion of family members in a TMT, the greater the negative impact of TMT positioning on innovative activity. In **H5**, we hypothesize that having high levels of family management inhibits a firm's research and innovation activities. The dashed black arrows capture the indirect effects of external stimuli on a firm's research and innovation activity. They indicate the mitigating effect of external stimuli on the relationship between family firms and internal governance and innovation activity. In **H6**, we posit that external stimuli (measured by competition effects) exert a stronger effect on family firms relative to non-family firms.

3. Data and methods

3.1 Data sources

The data used in this paper stems from the Enterprise Survey (ES), also known as the Business Environment and Enterprise Performance Survey (BEEPS). This survey is conducted jointly by the World Bank Group, the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), and the European Commission (EC) in European and Central Asian countries. The ES is a firm-level survey, which captures a representative sample of the private sector of the considered economy. The ES focuses on the manufacturing and services sectors and uses a stratified random sampling method [1].

As secondary data, the ES data set contains a wide range of business environment topics and information, particularly on firm characteristics, firm management, competition,

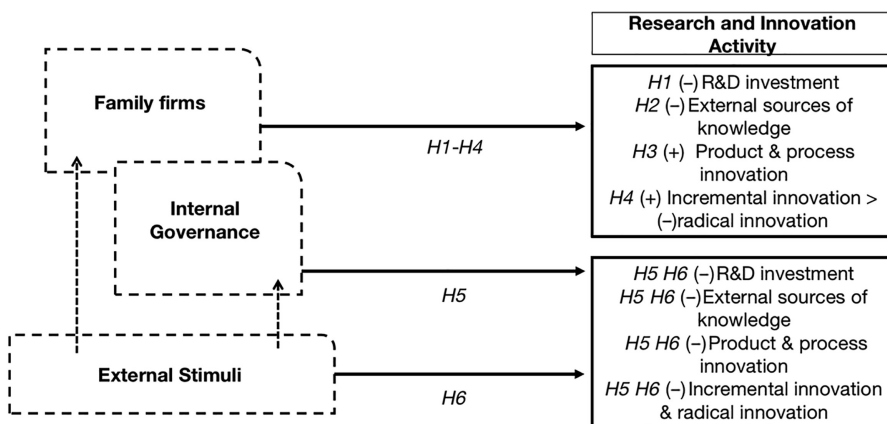


Figure 1.
A graphic representation of this research model and the hypotheses under analysis

innovation, and technology indicators. The data set allows this study to model in good detail the innovative behavior of family firms versus non-family firms, and the impact of family management and competition on innovation. ES data contain innovation variables that are defined in a way similar to that of the well-known Community Innovation Survey (CIS). However, the ES goes beyond the CIS by incorporating information on family ownership and governance. In addition, the quality of the ES data is a key asset, as this World Bank firm-level survey began in the 1990s and therefore provides not only an up-to-date global overview but also has 20 years of data on firm activity in 176 world economies. The data used in this analysis stems from the 2019-2020 wave and the list of countries used in this analysis are listed in the [online supplemental documentation](#).

3.2 Dependent variables

The ES data provide a comprehensive set of indicators for the innovative behavior of businesses. Information is collected on six distinct types of innovation activities, covering aspects of innovation inputs and innovation outputs. There is a high degree of concordance between the ES definitions of innovation activity and those in the Oslo Manual developed by the OECD and Eurostat for the measurement of innovation activity ([OECD/EUROSTAT, 2018](#)). However, while the Oslo Manual identifies four types of innovation output by companies (product, process, marketing, and organization innovation) the ES dataset is focused on product and process innovation outputs.

To measure incremental product innovation, referred to as new to firm (NtF) innovation, the ES asks companies:

- (1) “Has a new product or service been introduced or improved in the last three years?”.

To identify radical product innovation, referred to as new to market (NtM) innovation, companies are asked:

- (2) “Were any of the new or improved products or services also new for the establishment’s main market?”.

To capture process innovation companies are asked:

- (3) During the last three years, has this establishment introduced any new or improved process? These include: methods of manufacturing products or offering services; logistics, delivery, or distribution methods for inputs, products, or services; or supporting activities for processes.

These innovations are coded separately as three dichotomous variables that take a value of 1 if the firm introduces the relevant innovation, and 0 otherwise. The definitions of NtF, NtM, and process innovation are broadly consistent with existing literature ([Estrada *et al.*, 2016](#); [Chen and Chang, 2019](#); [Na and Kang, 2019](#)).

In addition to this, the ES data set also provides data on firm R&D expenditure, which is extensively used by many studies to measure company investment in innovation ([Mateut, 2018](#); [Adegboye and Iweriebor, 2018](#); [Kim *et al.*, 2019](#)). Internal R&D expenditure is an indicator of a firm’s efforts to create and absorb new knowledge ([Vega-Jurado *et al.*, 2009](#)). In the ES survey, companies were asked:

- (4) “Over the last three years, did this establishment spend on research and development activities within the establishment?”.

This is again coded as a dichotomous variable, taking a value of 1 if the firm engaged in R&D and 0 otherwise. This definition of R&D expenditure is consistent with [Menike \(2015\)](#), and [Hussen and Çokgezen \(2021\)](#).

This study also accounts for strategies of external knowledge acquisition. To capture external knowledge acquisition, firms were asked:

- (5) “Over the last three years, did this establishment spend on the acquisition of external knowledge? This includes the purchase or licensing of patents and non-patented inventions, know-how, and other types of knowledge from other businesses or organizations”.

Finally, to capture companies’ acquisition of external R&D they were asked:

- (6) “Over the last three years, did this establishment spend on research and development activities contracted with other companies?”

Both these variables are measured as binary indicators, taking a value of 1 if the company engaged in the relevant activity and 0 otherwise. The definitions of external knowledge acquisition and external R&D are consistent with those used by [Cassiman *et al.* \(2009\)](#), [Cainelli *et al.* \(2015\)](#), and [Mardones and Zapata \(2019\)](#).

3.3 Independent variables

A common way of distinguishing between family and non-family firms within the existing literature is to use the shareholding ratio of family members to non-family members ([Dyer, 2006](#); [Kellermanns *et al.*, 2010](#)). Consistent with that literature, this study defines a firm as family-owned if at least 50% of the firm is owned by the family ([Chrisman *et al.*, 2005](#); [Classen *et al.*, 2014](#); [Memili *et al.*, 2018](#)). This definition provides a dichotomous variable that takes a value of 1 for family-owned firms and 0 otherwise.

Further, to capture the strength of family management we consider the percentage of family members in key management positions, which we allocate to four binary categories: 0–24%, 25–49%, 50–74%, and 75–100%. This not only reflects the weight of family members in the decision-making process, but also reflects the degree of family control over the company ([Classen *et al.*, 2012](#)). This approach to capturing family participation in management is consistent with previous studies ([Manzanaque *et al.*, 2018](#); [Muñoz-Bullón *et al.*, 2020](#)).

To measure the degree of competition faced by firms, the ES asks, “For the main market in which this establishment sold its main product, how many competitors did this establishment’s main product face?”. In line with existing literature, such as [Crowley and Jordan \(2017\)](#), [Mendi and Costamagna \(2017\)](#), and [Crowley and Jordan \(2022\)](#), the natural log of the number of competitors in the main product market is used as a measure of competition. A higher number of competitors in a product market is expected to mean higher competition.

3.4 Control variables

The analysis also includes common controls that may impact firms’ research and innovation performance. This paper controls for firm size by including the natural log of the number of full-time employees of the firm. Existing literature highlights the importance of controlling for firm size. In our context, this is because smaller firms may be more efficient in their innovation efforts due to their more flexible management structure and ability to respond quickly to changing competitive markets ([Aiello *et al.*, 2021](#); [Perez-Alaniz *et al.*, 2022](#)). The models also control for the natural log of the age of the firm ([Coad *et al.*, 2016](#)), measured as the number of years since the firm was founded. Export orientation and internationalization have also been identified as important determinants of innovation activity ([Nieto *et al.*, 2015](#)). Therefore, export intensity is included in the analysis and is calculated as the ratio of the firm’s sales in foreign markets to total sales ([Galende and de la Fuente, 2003](#)). Similarly, we control for relationship between foreign ownership and

innovation (Dachs and Peters, 2014) by using the percentage of the firm owned by foreign individuals, companies, or organizations. Finally, we control for the size of the city in which the firm is located, as larger agglomerations have been identified as hotbeds of innovation where new and dynamic industries are likely to develop (Breau *et al.*, 2014; Lee and Rodríguez-Pose, 2014). A summary of the variable definitions and their associated means is provided in Table 1.

3.5 Methods

We apply an innovation production function framework to model the relationship between family ownership, family management, competition, and innovation activities (Geroski, 1990; Griliches, 1992; Crepon *et al.*, 1998; Crescenzi and Gagliardi, 2018; Audretsch and Belitski, 2020). We specify six individual models for different innovation outcomes, each with a dependent variable representing an innovation activity. These are internal R&D expenditure, external knowledge acquisition, external R&D expenditure, NtF product innovation, NtM product innovation, and process innovation. This approach is consistent with that of Roper *et al.* (2008) and Perez-Alaniz *et al.* (2022), among others.

The empirical modelling is divided into two stages. In the first stage, Equation (1) tests whether family businesses are more innovative than non-family businesses. At the same time, the impact of the level of competition by firm type on the innovation activities of firms is examined. The specification of the empirical model is as follows:

$$IO_{ih} = \beta_0 + \beta_1 FF_i + \beta_2 LC_i + \beta_3 (FF_i \times LC_i) + \beta_4 Co_i + \varepsilon_i \quad (1)$$

where IO_{ih} indicates that the company is engaged in a type of innovation activity or not, and h refers to innovation type. β represents the coefficients, FF_i is a binary indicator of whether firm i is a family business or not. LC_i is the degree of competition company i faces, measured as the number of competitors in the main product market. $FF_i \times LC_i$ is the interaction term used to verify how the inhibiting effect of family ownership on firms' innovation activities is affected by different levels of competition in the industry. Co_i is a series of control variables that may affect company i 's innovative behavior.

The second stage is to examine the impact of family management on the innovation activities of family firms, through Equation (2):

$$IO_{ih} = \beta_0 + \beta_1 FM_{di} + \beta_2 LC_i + \beta_3 IA2_{ei} + \beta_4 Co_i + \varepsilon_i \quad (2)$$

where FM_{di} represents the four dummy variables measuring the proportion of family members in top management positions. $IA2_{ei}$ represents the four interaction terms (family_management dummies \times competition) used to verify how the inhibiting effect of family management on firms' innovation activities is affected by different levels of competition in the industry. $\beta_2 LC_i$ and $\beta_4 Co_i$ are as defined in Equation (1).

As IO_{ih} , the dependent variables, are binary in nature, an estimation that uses either a probit or logit model would be appropriate. Both models are widely applied in the field of innovation (Gatignon and Robertson, 1989; Ur Rehman, 2016; Abdu and Jibir, 2018; Akinwale *et al.*, 2018; Seclen-Luna and Regalado, 2020; Hoang *et al.*, 2021). Gujarati (2011, p. 163) indicates that "in practice, there is no compelling reason to choose one [model] over the other. Many researchers choose the logit over the probit because of its comparative mathematical simplicity". For comprehensiveness, we provide the results of the logit model in the supplementary documents (Appendix 1). As can be identified from this table, the significance of the coefficients, their signs, and their relative magnitudes are consistent across both the probit and logit estimations. Furthermore, a correlation (Appendix 2) and VIF tests indicate no multicollinearity concerns. All the models control for robust standard errors.

Variable name	Variable definition	Mean	Std. Dev
<i>Innovation Performance</i>			
Product innovation (new to firm)	1 = During the last three years, this establishment introduced new or improved product or services 0 = otherwise	0.24	0.427
Product innovation (new to market)	1 = if the firm introduced a new or significantly improved goods that were new to the establishments main market in the previous three years, 0 = otherwise	0.165	0.371
Process innovation	1 = During the last three years, this establishment introduced any new or improved process, 0 = otherwise	0.135	0.342
Internal R&D expenditure	1 = Over the last three years, this establishment spend on research and development activities within the establishment, 0 = otherwise	0.175	0.38
External R&D	1 = Over the last three years, this establishment spend on research and development activities contracted with other companies, 0 = otherwise	0.082	0.275
External knowledge acquisition	1 = Over the last three years, this establishment spend on the acquisition of external knowledge (This includes the purchase or licensing of patents and non-patented inventions, know-how, and other types of knowledge from other businesses or organizations); 0 = otherwise	0.111	0.314
<i>Family firms</i>			
Family ownership	1 = at least 50% of the company is owned by the same family (or the family with the largest ownership if there is more than one family), 0 = otherwise	0.458	0.498
Family management	The percent of the key management positions of this firm are occupied by members of the same family	36.67	45.158
<i>Control variables</i>			
Local market	1 = main product sold mostly in same municipality where establishment is located, 0 = otherwise	0.445	0.497
National market	1 = main product sold mostly across the country where establishment is located, 0 = otherwise	0.442	0.497
International market	1 = main products are sold overseas, 0 = otherwise	0.114	0.317
Level of competition	Log of number of competitors of the establishment's main product faced in their main market	3.3	1.572
Location in capital or city with pop >1 m	1 = if the firm is located in a city with a of pop >1 million, 0 = otherwise	0.267	0.443
Location in city with pop. 250 k–1 m	1 = if the firm is located in a city with a pop of 250 k–1 m, 0 = otherwise	0.214	0.41
Location in city with pop. 50–250 k	1 = if the firm is located in a city with a pop of 50–250 k, 0 = otherwise	0.212	0.409
Location in city with Pop <50 k	1 = if the firm is located in a city with pop under 50 k, 0 = otherwise	0.28	0.449
Firm size	Logarithm of full-time employees	3.254	1.336
Firm age	2020- Year of establishment, in logarithm	2.802	0.698
Internationalization	The ratio of the firm's sales in foreign markets to total sales	9.508	23.801
Foreign involvement(foreign)	Percentage owned by foreign individuals, companies, or organizations	5.642	21.379

Table 1.
Definition of variables

4. Empirical results

Table 2 presents the marginal effects of the estimation in Equation (1). Family firms are significantly positively correlated with internal and external R&D, which contradicts the expectations of H1. The results also show a significant and positive relationship between family firms and external knowledge procurement. Therefore, H2 is also rejected. For product innovation and process innovation, again family firms are significantly and positively related to these innovation types relative to non-family firms, supporting the acceptance of H3. That is, the probability of family firms engaging in product innovation and process innovation is greater than that of non-family-firms. This result simultaneously provides support for the expectation outlined in H4 that family firms have a greater potential for incremental innovation (NtF). However, an unexpected result emerges for radical innovation, in that family firms are also more likely to introduce NtM innovations relative to non-family firms. H4 is therefore only partially supported.

Table 3 contains the marginal effect estimates of Equation (2), which examines the impact that different concentrations of family management in top management positions have on the research and innovation activities of the sampled family firms. The ratio of family management to non-family management is split into four categories (with the reference category being “less than 25% of family members in top management positions”), as seen in Table 3. Firms containing higher concentrations (greater than 50%) of family involvement in firm governance invest less in internal R&D and NtF product innovations. When the proportion of family members in key management positions is between 50 and 74%, there is also a negative relationship between family management and NtM product innovation and external knowledge. Finally, firms with over 75% of family members in key management positions conduct fewer process innovations. Consequently, H5 is partially confirmed, dependent on the aspect of innovation activities referred to. However, broadly speaking, more family management involvement has negative consequences for innovation activities.

H6 was tested in two ways. First, by estimating how the level of industrial competition affects the level of research and innovation activities of family firms as a whole, relative to non-family firms, and second by estimating the interaction terms of industry competition with family management involvement. In Table 2, we note that, on average, higher levels of competition are negatively associated with the level of research and innovation activities among all firms in the sample, irrespective of whether the firm is owned by family or non-family. Controlling for this general trend, we find a significant and positive relationship between competition and external knowledge-seeking activities, and a significant but negative relationship between competition and NtF product innovation among family firms, while the interaction terms of competition with other types of research and innovation activities remain insignificant. However, Norton *et al.* (2004) highlight that computing the marginal effect of a change in two variables needs care in nonlinear models. Consequently, we follow the INTEFF command as written by Norton *et al.* (2004) to estimate the correct marginal effect and its associated significance level. This analysis is outlined in Appendices 3 and 4 of the supplemental documentation, which shows that the evidence of a significant effect in the interaction effects in Table 2 are absent for most observations. This provides limited support for the contention that competition has an asymmetric effect on family firms, relative to their non-family counterparts. Consequently, H6 is rejected. However, there are nuances to how market competition may have an impact on family firms' innovation, which is considered next.

We analyze the interaction of family management involvement with competition among only family firms. In most cases, the identified patterns are most relevant to firms with a higher level of family management involvement (i.e. more than 50%), as firms with more than 50% of family involvement in management are significantly more likely to invest in R&D and seek external knowledge due to increased competition. Firms with heavy family involvement (greater than 75%) are also more likely to introduce NtF and process innovation, relative to

Table 2.
Results of Equation (1)
Innovation and Family
and Non-Family firms

	Internal R&D	External R&D	External knowledge	New to firm product (NfF)	Process innovation	New to market product (NfM)
Family firm	0.0120*** (0.00528)	0.00896*** (0.00351)	0.0143*** (0.00427)	0.0415*** (0.00624)	0.0193*** (0.00461)	0.0350*** (0.00523)
Level of competition	-0.0143*** (0.00211)	-0.00550*** (0.00139)	-0.00978*** (0.00172)	-0.0251*** (0.00254)	-0.0138*** (0.00188)	-0.0205*** (0.00211)
Competition × family firms	0.000127 (0.00308)	-0.000352 (0.00202)	0.00501** (0.00246)	-0.00867** (0.00361)	0.00143 (0.00265)	-0.00385 (0.00300)
National market	0.0955*** (0.00582)	0.0419*** (0.00403)	0.0457*** (0.00469)	0.0728*** (0.00660)	0.0442*** (0.00500)	0.0591*** (0.00557)
International market	0.130*** (0.0155)	0.0734*** (0.0117)	0.0856*** (0.0132)	0.0510*** (0.0153)	0.0608*** (0.0126)	0.0392*** (0.0131)
Internationalization	0.000582*** (0.000141)	0.000106 (8.95e-05)	5.20e-05 (0.000115)	0.000762*** (0.000177)	0.000306** (0.000124)	0.000371** (0.000146)
Foreign involvement(<i>foreign</i>)	-0.000122 (0.000108)	8.00e-06 (6.71e-05)	0.000274*** (8.29e-05)	0.000327** (0.000132)	0.000131 (9.29e-05)	0.000291*** (0.000107)
Firm size	0.0389*** (0.00199)	0.0258*** (0.00128)	0.0240*** (0.00158)	0.0220*** (0.00240)	0.0190*** (0.00175)	0.0180*** (0.00198)
Firm age	-0.00517 (0.00372)	-0.00564** (0.00245)	-0.00841*** (0.00300)	-0.00236 (0.00438)	-0.00472 (0.00324)	0.00288 (0.00366)
Manufacture	0.106*** (0.0177)	0.0316*** (0.0115)	0.0412*** (0.0147)	0.1775*** (0.02290)	0.0114*** (0.0221)	0.0105*** (0.0191)
Service	0.108*** (0.0237)	0.0400*** (0.0154)	0.0947*** (0.0211)	0.172*** (0.02993)	0.123*** (0.0327)	0.0949*** (0.0251)
Retail	0.0681*** (0.0236)	0.0370** (0.0164)	0.0779*** (0.0218)	0.1799*** (0.0318)	0.1322*** (0.0358)	0.103*** (0.0271)
Observations	20,995	20,995	20,995	20,995	20,995	20,995
LR χ^2 (18)	2271.11	1257.63	1234.35	2366.52	1616.06	1636.17
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.1174	0.1061	0.0849	0.1029	0.0977	0.0880
Log likelihood	-8536.3355	-5297.8981	-6652.7896	-10320.769	-7463.578	-8475.212

Notes(s): (1) The model controls for location, size effects and country dummies but they are not reported due to space constraints
(2) Marginal effects are reported in the table. ***, significant at 1%; **, significant at 5%; *, significant at 10%
(3) The sector reference category is construction

	Internal R&D	External R&D	External knowledge	New to firm product (NIF)	Process innovation	New to market product (NIM)
Family management dummy (25–49%)	0.0150 (0.0476)	0.00285 (0.0296)	-0.0493* (0.0256)	-0.0694 (0.0500)	-0.0321 (0.0352)	-0.0398 (0.0410)
Family management dummy (50–74%)	-0.0643*** (0.0224)	-0.0348*** (0.0128)	-0.0435** (0.0191)	-0.0822** (0.0320)	-0.0263 (0.0243)	-0.0492* (0.0264)
Family management dummy (75–100%)	-0.0671*** (0.0252)	-0.0274* (0.0164)	-0.0133 (0.0198)	-0.0739** (0.0304)	-0.0844*** (0.0243)	-0.0287 (0.0248)
National market	0.113*** (0.00913)	0.0504*** (0.00647)	0.0537*** (0.00760)	0.0691*** (0.0105)	0.0513*** (0.00837)	0.0544*** (0.00905)
International market	0.127*** (0.0215)	0.0965*** (0.0179)	0.1143*** (0.0201)	0.0577*** (0.0228)	0.115*** (0.0208)	0.0494** (0.0200)
Level of competition	-0.0301*** (0.00614)	-0.0156*** (0.00404)	-0.0114** (0.00516)	-0.0545*** (0.00782)	-0.0291*** (0.00575)	-0.0347*** (0.00657)
Internationalization	0.000776*** (0.000204)	0.000146 (0.000131)	-0.000107 (0.000175)	0.000681** (0.000276)	-0.000112 (0.000199)	0.000153 (0.000231)
Foreign involvement(<i>foreign</i>)	-0.000207 (0.000184)	-0.000166 (0.000117)	0.000211 (0.000149)	0.000237 (0.000241)	0.000178 (0.000172)	0.000196 (0.000197)
Firm size	0.0411*** (0.00319)	0.0271*** (0.00206)	0.0258*** (0.00267)	0.0244*** (0.00408)	0.0225*** (0.00307)	0.0198*** (0.00344)
Firm age	0.00280 (0.00683)	-0.00419 (0.00385)	-0.00109 (0.00489)	-0.0100 (0.00714)	-0.00841 (0.00550)	-0.00390 (0.00606)
Manufacture	0.0670* (0.0354)	0.0191 (0.0234)	0.0531 (0.0325)	0.241*** (0.0507)	0.233*** (0.0705)	0.206*** (0.0498)
Service	0.0522 (0.0406)	0.0237 (0.0275)	0.114** (0.0452)	0.237*** (0.0626)	0.274** (0.109)	0.212*** (0.0683)
Retail	0.0164 (0.0386)	0.0251 (0.0286)	0.0907** (0.0450)	0.233*** (0.0643)	0.271** (0.114)	0.214*** (0.0713)
Competition × family management dummy (25–49%)	0.00112 (0.0136)	-0.000515 (0.00918)	0.0183 (0.0117)	0.0274 (0.0174)	0.0162 (0.0126)	0.0212 (0.0143)
Competition × family management dummy (50–74%)	0.0242*** (0.00861)	0.0164*** (0.00564)	0.0153*** (0.00734)	0.0166 (0.0111)	-0.00151 (0.00841)	0.00982 (0.00935)
Competition × family management dummy (75–100%)	0.0171** (0.00674)	0.00965** (0.00445)	0.00477 (0.00566)	0.0166* (0.00852)	0.0189*** (0.00632)	0.00473 (0.00717)
Observations	9633	9633	9633	9633	9633	9633
LR χ^2 (22)	1,111.39	623.85	499.56	904.24	647.09	614.31
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.1219	0.1104	0.0707	0.0796	0.0773	0.0659
Log likelihood	-4001.8652	-2513.6477	-3282.8967	-5229.0808	-3859.5463	-4352.948

Note(s): (1) The model controls for location, size effects and country dummies but they are not reported
(2) Marginal effects are reported in the table. ***,significant at 1%; **,significant at 5%; *,significant at 10%
(3) Reference category is construction
(4) Reference category is family management dummy (0–24%)

Table 3.
Results of Equation (2)
family management

firms in the 0–25% category. On this occasion, when the INTEFF check is conducted, there is evidence of a significant interaction effect present for most observations, supporting the claim that competition impacts the innovation activities of family firms where there is a high proportion of family members in management positions. Therefore, H6 is rejected in terms of there being no differences in the competition effect for family versus non-family firms. But we can conclude that competition has an impact within the family firm sample and that the extent of its impact is conditioned by the degree of family management involvement.

To control for the potential likelihood that a firm decision to engage in innovation activities is jointly determined, a multivariate probit (MVP) model was estimated as a robustness test (see [Appendix 5](#) in the supplementary section). The results mirror the results presented in [Tables 2 and 3](#) using independent probit models.

5. Discussion of the hypotheses

In contrast with previous research ([Hoffmann et al., 2015](#); [Asaba and Wada, 2019](#)), the results presented here indicate that family firms are more likely to implement both internal and external R&D, relative to non-family firms. Whilst this is a surprising result in the context of the empirical literature, [Chrisman and Patel \(2012\)](#) have previously argued that if the family's long-term goals for organizational continuity and strong intergenerational control are given sufficient importance, they will invest more in R&D to achieve them.

The findings of this paper provide evidence to support the view that family firms are more likely to have greater external R&D and external knowledge acquisition than non-family firms; this aligns with findings from [Aiello et al. \(2020\)](#). But again, the [Aiello et al. \(2020\)](#) findings are at odds with the results of previous studies ([Classen et al., 2012](#); [Nieto et al., 2015](#)) that find family firms overall engage less in these types of activities relative to their non-family counterparts. In all, this paper's findings in relation to innovation investment suggest that family firms may be less conservative than originally thought, and may not fear knowledge leakage when they engage in both external R&D and knowledge acquisition. This coincides with the often-argued view that the rich social capital inherent in family firms enables them to acquire more contacts and increase their knowledge absorption capacity; their social capital thus becomes a vital component for translating external knowledge into innovation performance ([Arregle et al., 2007](#); [Carney, 2005](#)).

It has been argued that the organization of a firm's innovation management is typically determined by its size and ownership structure ([Werner et al., 2018](#)). The unification of ownership and management in family firms often leads to an organizational flexibility that surpasses that of non-family firms, facilitating improved internal governance structures that foster innovation ([Lubatkin et al., 2007](#); [Hatum and Pettigrew, 2004](#)). Consistent with existing research ([Dong et al., 2019](#)), family-owned firms are more likely to implement NtF and process innovation, compared to non-family firms ([Table 2](#)). However, in stark contrast, family firms with higher proportions of family in top management positions are less likely to invest in NtF product and process innovations ([Table 3](#)). Such a finding suggests that a lack of diversity in top management positions may impact networking opportunities and translate to poor internal decision making. When the much-discussed characteristics of conservatism, risk aversion, and the inherent risk of family appropriation of resources translate into management decision making, they may impede the innovation ambitions of family firms.

Finally, this paper set out to analyze the impact of external stimuli through examining the impact of the competitive environment on the innovative activities of family firms, something that has not received much attention in the existing literature. The results indicate that competition has a negative impact on the innovation activities of both family and non-family firms, with the interaction term analysis ([Table 2](#)) indicating no discernible moderating competition-innovation differences between the two categories of firm. However, while family firms with a high degree of family involvement in their management do fewer innovation

activities, external rivalry spurs these firms to engage in more innovation activities (Table 3). This implies that family firms appear to be more sensitive to market signals, which lends support to a previous proposition by Park *et al.* (2019) that market competition creates a learning environment where family firm innovation can develop.

6. Conclusion

This study examines the heterogeneity of innovation in family versus non-family firms. It does so by exploring how the propensity of firms to conduct six research and innovation activities differs by family and non-family ownership. This study also investigates the role of internal family governance and the impact of external stimuli (proxied by competition) on the innovation activities of family firms.

The insights discovered here contribute to ongoing debates in the family firm innovation literature. Prevailing literature suggests that family firm ownership is negatively correlated with R&D investment, external knowledge acquisition, and new to market innovation. However, our analysis implies the opposite, indicating that family firms may not be as conservative and rigid as previously thought (Schulze *et al.*, 2002; Chrisman *et al.*, 2015a). In the context of such a proposition, it is particularly noteworthy that they are even more likely to introduce radical NtM innovations than their non-family-owned counterparts. This study supports previous findings on the positive influence of family firm ownership on NtF and process innovation (Duran *et al.*, 2016; De Massis *et al.*, 2016; Németh and Dóry, 2019). The unique advantages inherent in family firms that allow them to change their internal organizational structure in response to the external environment (Broekaert *et al.*, 2016) may be key drivers underlying these patterns.

The second key insight of the paper is that too much family involvement in the management of a firm inhibits its innovation; this finding aligns with this paper's expectations and with much of the literature (Astrachan and Jaskiewicz, 2008; Filser *et al.*, 2016; Kraiczky *et al.*, 2014; Migliori *et al.*, 2020). Nevertheless, given that much of the literature points to family-owned firms as being less likely to invest in innovation or to introduce radical NtM innovations, it is noteworthy that in the results presented here, only the configuration of top management that has a much higher proportion of family involvement inhibits the likelihood of firms engaging in activities such as R&D and external knowledge sourcing. Hence, the results provide contrasting stories in that while family firm ownership is positive for innovation, too much family involvement at management level may hamper innovation. This presents interesting implications for the owners and managers of family firms. Critically, whilst family-owned firms do not appear to suffer from the conservative, risk averse, and reluctant to change characteristics often attributed to them, these features may in fact manifest through firm-level management structures, resulting in adverse consequences for their innovation activities.

Finally, in contrast to previous studies by Chen *et al.* (2017) and Jiang (2017), the findings of this paper place this study in a near unique position, being one of the few papers to explore the impact of competition on innovation in family firms. Whilst competition does not have an asymmetric impact by firm type, when the sample of family firms is considered in isolation, competition is identified as critical for spurring family firms with high levels of family management involvement to invest in R&D, NtF product innovation, and process innovation. This suggests that market competition works as a stimulus for family firms to invest in innovation or improve their process innovation, which positively impacts on their level of innovation. However, this stimulus has its limits. It plays little role in pushing out radical innovation, i.e. NtM product innovation. Again, these findings have some interesting implications for the literature and also for policymakers and family business owners and managers. We discuss these implications next.

6.1 *The paper's contribution*

This study makes three important contributions to the family firm innovation literature. First, this study enriches existing knowledge on the relationship between innovation and family firm ownership and management dynamics. Previous studies have mostly identified a negative impact of family involvement and ownership on innovation decisions (e.g. R&D investments) (Matzler *et al.*, 2015; Broekaert *et al.*, 2016; Luo *et al.*, 2021). This study presents evidence that runs counter to these findings and provides significant evidence for the positive capacity of family-owned firms to engage in a diverse range of research and innovation activities. This study shows that, *ceteris paribus*, family firms are more innovative than non-family firms. The results provide empirical support for the application of resource-based theory to the study of different innovative activities in family firms. The familial nature of family firms means that the common language and experience of family members may enable them to combine individual and team knowledge more easily, as well as to communicate and share information more efficiently (Daspit *et al.*, 2019). Thus, the shared vision between family members and their competence at co-constructing knowledge allows them to share and reconfigure complex knowledge systems, thus strengthening the knowledge transformation capabilities of such enterprises (Patel and Fiet, 2011).

Family firms can translate new knowledge for strategic reasons (e.g. development of new product) when it is adapted to fit within the firm (Volberda *et al.*, 2010). Therefore, that notion that the underlying conservatism, rigidity, and nepotism of family-owned firms may hinder their research and innovation activities does not seem to be supported by the evidence in this paper. However it should be noted that our suggestions for the mechanisms underlying this dynamic are purely speculative, and that uncovering the exact mechanisms should be regarded as an avenue for future research.

Secondly, this study critically identifies that the previous findings in the literature identifying family firms as investing less in innovation are most likely to be manifested through the dynamics and composition of the firm's management. The agency theory perspective suggests that greater family member involvement in TMT can lead to destructive altruism, to the extent that it can counteract any positive innovation strategy (Madison *et al.*, 2016). It has previously been identified that non-family managers can offer more managerial expertise and more diverse external knowledge (Veider and Matzler, 2016). A TMT with a heavy concentration of family membership may inhibit that diversity of knowledge and act as a barrier to successful radical innovation.

Finally, this study extends the ongoing debate on the innovative behaviour of family firms to an under-explored but noteworthy aspect—the impact of external stimuli via market competition processes. Given the extensive work that has been undertaken in previous studies to address the relationship between competition and SME innovation (Aghion *et al.*, 2018; Cabanelas *et al.*, 2019; Lee *et al.*, 2020), it is surprising this is not more developed in the family firm literature. This study responds to Park *et al.*'s (2019) call to complement knowledge gaps at the intersection of the external environment and family business research fields by exploring the role of market competition in inhibiting or facilitating innovative activity in family businesses. The findings presented here indicate that family firms are not more (or less) sensitive to competition effects, relative to their non-family firm counterparts. This finding provides a useful mirror for understanding the behavior of family firms versus non-family firms in today's highly competitive industry environment. It can also reassure policymakers that a one-size-fits-all competition policy is unlikely to have an asymmetric impact on family firms, relative to their non-family counterparts.

6.2 *Implications of the research*

This study has several implications for family business managers and policy makers. Firstly, managers must be aware of the negative impact on innovation of excessive family

involvement in firms' internal governing structures. Specifically, this study highlights that having a high concentration of family members in key management positions will have negative effects on firm innovations. Family business managers should be cautious regarding the excessive inclusion of family members in the TMT; this study identified negative innovation performance implications when more than 50% of TMT are family members for many innovation indicators. Therefore, appointing a non-family CEO or employing a certain proportion of non-family managers is an important governance measure for overcoming possible nepotism, which can boost a family firm's innovation potential (Ceipek *et al.*, 2021). Non-family members can make an important contribution by expanding the knowledge base of the family business through introducing new viewpoints that are not formed by family experience. They can also diverge the firm's thinking tendencies, in turn expanding its cognitive diversity, which will assist with conflict resolution and enhance management expertise (Sonfield and Lussier, 2009). Previous research has confirmed that family firms managed by professional and independent non-family managers are more focused on disruptive technologies and radical innovations, enhancing the innovativeness of the firm (Lazzarotti and Pellegrini, 2015).

Secondly, this research can help policy makers to recognize the key role that family firms play in creating innovation. As innovation is one of the key factors by which family firms can gain competitive advantage, there is a need to understand the innovative behaviour of family firms and to develop policies to support them in improving their innovative performance. Specifically, given the importance of family businesses to economic development, policies should ensure that family businesses are included, represented, and informed by all available research and innovation support. Thus, any support that might strengthen the links between family firms and external institutions and enable family firms to leverage knowledge from universities and research institutions could improve innovation performance without compromising family goals (Aiello *et al.*, 2021). Furthermore, given that family firms are more likely to acquire knowledge from external sources, policies that provide family firms with external advisors are another way for them to access external knowledge without losing the benefits of the family.

Lastly, the findings suggest the impact of external competitive forces on family firms' innovative behavior does not differ from the impact they have on non-family firms. We identify that higher levels of competition inhibit innovation outcomes in both types of firms. Thus, contrary to popular policy narratives, efforts to maximize competition may not be productive in achieving greater innovation outcomes. A possibly better route is to look for win-win opportunities with competitors, while averting reciprocally subversive competition to acquire some advantages (i.e. knowledge of partners' strategic initiatives and access to complementary resources) (Quintana-García and Benavides-Velasco, 2004). Policies should therefore consider balancing competition and cooperation acts that can enhance firms' innovation performance (Park *et al.*, 2014).

6.3 Limitations of the paper

There are several limitations to this study. Firstly, the cross-sectional data used in this study makes it difficult to disentangle the endogeneity of innovation inputs and outputs, in that it is not possible to decipher if firms that engage in more R&D have more innovation outcomes, or vice versa. Secondly, this study identified that competition has a negative impact on innovation outcomes for both family and non-family firms. However, this is through the lens of a static analysis rather than a dynamic one. Hence, the adoption of panel data may provide more nuanced insights into the competition-innovation nexus in family firms. Thirdly, whilst family firms are more likely to innovate, it is not possible, given the data here, to decipher the exact underlying mechanisms (e.g. social capital, resource based familiness) driving this pattern. Hence, future research should attempt to open this black box. Finally, this study has focused on the relationship between family firms and innovation inputs and innovations outputs.

But of course, innovation is not an end in and of itself, and future research could explore whether family firms are better at translating innovation into profits and growth.

Note

1. For more detailed discussion on the ES survey methodology, please see <https://www.enterprisesurveys.org/en/methodology>

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Appendix

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