Universitat Autònoma de Barcelona

Three Essays on
Innovation in Family Firms and Corporate Governance

Malgorzata Kurak

Universitat de les Illes Balears

Universitat Autònoma de Barcelona

Universidad Pública de Navarra
Nafarroako Unibertsitate Publikoa

Doctoral Dissertation

Three Essays on Innovation in Family Firms and Corporate Governance

Author:

Malgorzata Kurak

Supervisors:

Miguel Ángel García-Cestona, Ph.D.

Teresa García-Marco, Ph.D.

Ph. D. program in Economics, Management and Organization (DEMO)

Facultat d'Economia i Empresa

Universitat Autònoma de Barcelona

2017

Acknowledgements

Several people have contributed to the completion of this doctoral dissertation. I would like to express my sincere gratitude to each and every one of them. First and foremost, I am very grateful for my research guides: Teresa García Marco and Miguel García Cestona. This thesis would not have been possible without their valuable feedback, scholarly inputs, and continuous encouragement throughout this journey. I would also like to thank Reinhilde Veugelers, Alfredo de Massis, and Martin Larraza Kintana for serving as my committee members and advancing this work even further in its excellence and contribution to the field.

These past three years have been nothing but positive and memorable. I can say without a doubt that I have grown not only as a scholar, but overall as a person. During this time, I have experienced a number of great (scholarly) adventures and met wonderful colleagues and lifelong friends. Although a full list of names would be too long for this acknowledgement, I thank them all. I am particularly grateful for those who supported me in the writing process, and motivated me to strive towards the end goal.

Special thanks to my colleagues from the Autonomous University of Barcelona: Jorge Andrés Vélez for being my much appreciated econometrics guru, Jessica Ellis for being the best company during those long nights in the office, and Jonathan Calleja Blanco for sharing his passion for running with me.

Many thanks to Guntram Wolff, Director of Bruegel and, again, Reinhilde Veugelers for introducing me to the world of a European think tank. I truly appreciate your generosity and accepting me as a part of the Bruegel team from day one.

I owe a sincere thank you to Jordi Surroca and my other colleagues from the University of Groningen, for the warm welcome and continuous engagement in insightful scholarly debates.

I also would like to express my gratitude to colleagues from IESE Business School: Bruno Cassiman, Massimo Maoret, Giovanni Valentini, and my fellow Ph.D. students Victoria

Moreno, Alice Mascena and Daniele Battaglia. Your constructive feedback and cheerful comments have motivated me to continuously improve and advance to the final phase this project.

A special thanks to my parents. Words cannot express how grateful I am to my mother and father for all of their love and support. They have been a source of motivation and inspiration all these years. I dedicate this thesis to them.

Finally, I would like to thank all of my friends; especially, Natalia and Steve, who supported me in writing, helped me to focus, and overcome setbacks. I would also like to express my gratitude to my sister, Anita, for her constant support and belief in the successful completion of this project.

Thank you all! I have no other words to better express this overwhelming feeling.
Now it's time for the next challenge. On y va!

Barcelona, September 2017
Malgorzata Kurak

Tesis de Tres Ensayos

Abstracto

Esta tesis se compone de tres trabajos empíricos, cada uno de los cuales presenta un análisis diferenciado sobre el tema de innovación en las empresas familiares y gobierno corporativo. Nuestro objetivo es proporcionar evidencia sobre bajo qué circunstancias, propietarios y gerentes pueden mejorar la innovación de una empresa. El primer artículo estudia cómo el tipo de diferentes propietarios impacta en la innovación de una empresa, explorando también el efecto moderador de las contingencias de poder en esta relación. El segundo artículo se centra en las empresas familiares, e investigamos cómo los directivos no familiares en estas empresas se comportan ante la innovación y cómo los sistemas descentralizados de toma de decisiones pueden moderar su comportamiento. Finalmente, el tercer trabajo examina "la paradoja de la capacidad y la voluntad" en la innovación de las empresas familiares. En este capítulo evaluamos el impacto de la implicación familiar en las capacidades e innovación y ofrecemos recomendaciones útiles a empresas familiares sobre cómo afrontar eficazmente sus desafíos específicos de gobernabilidad mientras siguen siendo innovadoras.

Three Essay Dissertation

Abstract

This dissertation consists of three empirical papers, each presenting a differentiated analysis on the subject of innovation in family firms and corporate governance. Our aim is to provide evidence about the circumstances in which owners and managers can enhance a firm's innovation. The first article studies how different owners' type can impact a firm's innovation, exploring also the moderating effect of the power contingencies on these relationships. The second paper focuses on family firms, and we investigate how the non-family managers affect a firm's innovation and how decentralized decision-making systems can moderate their behavior. Finally, the third paper examines "the ability and willingness paradox" in family firm innovation. There, we assess the impact of family involvement on firm's capabilities and innovation, and provide useful recommendations to family firms concerning how to deal effectively with their specific governance challenges while remaining innovative.

List of Original Articles

1. Owner Type and Innovation in European Firms: The Impact of Power Contingency

Malgorzata Kurak, Miguel García-Cestona, Teresa García-Marco

Working Paper

2. Non-Family Managers and Innovation in Family Firms: The Impact of Decentralization

Malgorzata Kurak, Miguel García-Cestona, Teresa García-Marco

Working Paper

3. Family Involvement and Innovation: The Capabilities' Paradox

Malgorzata Kurak, Miguel García-Cestona, Teresa García-Marco

Working Paper

Content

PART I: OVERVIEW OF THE DISSERTATION

1. Introduction

This study deals with aspects of corporate governance and innovation in European firms. More specifically, we analyze the impact owners and managers have on the likelihood that European firms implement innovation, and the factors enhancing this relationship. In the post-global financial crisis era, it is prevalent that individuals, teams, organizations, and communities face challenges related to the slow pace of economic recovery. Evidence shows that innovation is vital for the recovery and growth, and in this circumstance continuous innovation is required. Yet, many firms and their stakeholders fail to realize the benefits of innovation. In addition, different stakeholders may have other views and motivations on whether to engage in innovation or not. Scholars have aimed to tackle the problem of innovation governance in firms, but they have provided mixed conclusions, finding either a positive, a negative, or even nonsignificant relationship between both factors (Belloc, 2012; Francis & Smith, 1995; Honoré, Munari, & van Pottelsberghe de La Potterie, 2015; Thomsen & Pedersen, 2000). Furthermore, it has been shown that the hierarchical systems, or central monitors, do not always work well with innovation (Duran, Kammerlander, van Essen, & Zellweger, 2016).

For these reasons, we have taken a more holistic approach in our analysis of the relation between corporate governance and innovation. We have analyzed various types of ownership and management in firms from an inside-out perspective, i.e., those strategical processes which rely on the core competencies of a firm to drive innovation as opposed to the external factors. First, we have aimed to clarify whether the heterogeneity of European firms' innovation can be explained by their owner's type, and if so, explore the role of power contingencies like an ownership concentration and the cultural power distance play in moderating owners' attitudes towards innovation. Second, we have focused on the challenges that family firms experience on their way to become innovative market leaders. Particularly, we have zoomed into the so-far undermined role of non-family managers in family firm innovation. Finally, we have further explored the root causes of family firm unwillingness to innovate. We have analyzed how the balance between ability and willingness varies when we consider

family and non-family firms. Hence, we aimed to answer the following questions: (1) How does the owner's type impact European firm's innovation, and what role do these power contingencies like an ownership concentration and a cultural power distance play in moderating this relationship? (2) How does the governance mechanism trigger different attitudes towards innovation in those non-family managers working for family firms? (3) In what circumstances do family firms experience an innovation paradox, and how does the balance between "the ability and the willingness" vary in the case of family and non-family firms?

Previous scholarly research has attempted to provide insights to those questions, but without providing any final conclusions. More precisely, it has been theorized that an owner plays an important role in shaping a firm's strategy (and also their innovation strategy) (Munari, Oriani, & Sobrero, 2010), but they focused mostly on a firm's owner types like an institutional investor, a government, a bank, etc. (Thomsen & Pedersen, 2000). Furthermore, and in relation to family firms, it has been shown that in those family controlled firms the distinction between the role of a principal and the agent at the time of exercising ownership, control and management may become a hurdle (Kammerlander, Dessì, Bird, Floris, & Murru, 2015; Peng & Jiang, 2010). In this vein, they left the question regarding the impact of the governance mechanism on the agents (and particularly non-family related managers) working for family firms unexplored. Some scholars guided by concepts from agency theory and behavioral agency theory, have explored the conditions of ownership and leadership that promote superior performance among non-family CEOs of family firms (Miller, Breton-Miller, Corbetta, & Pittino, 2014). However, and among many measures of a firm's performance, they have not considered how those effects would interplay in terms of a family firm's innovation. Finally, other streams of research have relied on the notion of socioemotional wealth preservation in explaining a family firm's behavior towards innovation (Chrisman, Chua, De Massis, Frattini, & Wright, 2015). The framework of the family firm's "ability" but "lack of willingness" to innovate has received a wider scholarly acceptance. In spite of their contributions, it has not yet been determined what specific firm's abilities the family involvement can diminish to remain locked in that position of unwillingness to innovate.

As we have shown above, there exist ongoing scholarly debate on those relevant research questions. Considering the current global trends of the further divergence of interests between particular individuals, teams, organizations, and communities; and knowing that innovation had been proved to genuinely contributing to the vision of sustainable economy from which consumers and citizens, as well as organizations, all benefit; we have a duty to provide more viable answers to those research questions. As a result we have studied the phenomena described above more deeply, and we truly believe that our conclusions can have an impact on the family owners and managers' understanding of the ways in which innovative organizations should be governed.

2. Overview of the essays

In this section we provide a brief overview of the key findings and contributions of the three articles. In the first two empirical papers, we used EFIGE data on European firms provided by Bruegel, whereas in the last article, we used ESEE data on Spanish manufacturing firms collected by the SEPI Foundation.

More specifically, the EU-EFIGE/Bruegel-UniCredit dataset includes information about firms from Austria, France, Germany, Hungary, Italy, Spain, and the UK. The data were collected within the "European Firms in a Global Economy: Internal Policies for External Competitiveness" (EFIGE) project carried out from September 2008 to August 2012. It was supported by the Directorate General Research of the European Commission through its 7th Framework Program (Altomonte & Aquilante, 2012). The EFIGE data provide comparable and consistent cross-country information on the characteristics of ownership structure and innovation among European firms. The information collected is cross-sectional for the budget year 2008. To ensure standard statistical representativeness of the collected data, the EFIFE dataset has been built so as to fulfill three criteria: (1) the availability of an adequately large target sample of firms; (2) a minimum response rate of 85-90% for five to ten key questions previously agreed; (3) a proper stratification of the sample in order to ensure representativeness of the collected data ex-ante and ex-post for each country. The EFIGE dataset is truncated to prevent firms' identification with categorized industry sectors by NACE2. The total sample includes 14,759 individual observations (including 10,365 of those firms are owned by individuals or controlling families). In the first paper, we also used

Hofstede's Power Distance Index (PDI), available in the Values Survey Module 2013 (VSM 2013) dataset, and the Global Leadership and Organizational Behavior Effectiveness (GLOBE) Phase 2 for the 2004 dataset.

The ESEE data contains primary data from the Survey on Business Strategies (Encuesta sobre Estrategias Empresariales - the ESEE), and it is conducted on a yearly basis by the National Bureau of Industrial Activity Foundation (Fundación SEPI) supported by the Spanish Ministry of Industry. The survey was designed to gather data from a representative sample (by size and industry) of the population of manufacturing firms in Spain. In the initial survey year (1990) the ESEE included information on 2,188 firms. We were able to gather data from 1991 to 2011. Throughout these 20 years, some firms have chosen not to participate in the survey for various reasons. However, a representative sample of newly created firms in Spain from 1991 onwards has been included in the ESEE on a yearly basis. As a result, our initial sample consists of an unbalanced panel of 3,365 firms and 32,989 firm-year observations from 1991 to 2011.

Both the EFIGE data and the ESEE data provide unique information on a firm-level European (and Spanish in the case of the ESEE database) firm's activities. Therefore, we were able to apply various measures of innovation in our empirical models. Using information given by the EFIGE data, we have created the following dependent variables to capture a firm's innovation performance: (1) product innovation; (2) process innovation; (3) innovative products sales. In the case of the ESEE data we were able to construct similar measures of product innovation and process innovation, and additionally, we have used another variable that measures a number of product innovations introduced by a firm. These firm's innovation measures have been adopted in a number of previous scholarly works (Alegre & Chiva, 2008; Cruz-Cázares, Bayona-Sáez, & García-Marco, 2010; Hagedoorn & Cloodt, 2003; Hitt, Hoskisson, Johnson, & Moesel, 1996), however, applying them also brings some limitation. Hence, in the age of innovation, Big Data, Artificial Intelligence (AI) and Machine Learning (ML) we are still using some subjectively reported dummy measures to scope a firm's innovation.

Similar comments apply to the measures related to the controlling family that are available in the databases described above. The EFIGE data includes only limited information about the controlling family. Some questions included in the EFIGE survey indicate the presence of family ownership, or if a firm is directly or indirectly controlled

by an individual or family-owned entity, or the number of actively working family managers in a firm. In relation to the ESEE database, it includes only limited information about the controlling family, and precisely, it provides a number of owners and owner's relatives who occupy top managerial positions in family firms. Nevertheless, previous scholarly research had assumed, and empirically validated, that "a family's vision and goals are highly correlated to the extent of family involvement in the firm" (Gomez-Mejia, Makri, & Larraza-Kintana, 2010; Kotlar, De Massis, Frattini, Bianchi, & Fang, 2013).

Consequently, our data limitations determine how we estimate a firm's probability of achieving an innovation. In line with a statistical practice of modeling binary dependent variables, we use logistic regression in our estimation models following the methodology by Aiken and West (1991), and later extended by Dawson (2014). In addition, we run simple regression models to test the impact of our dependent variables on the family firm's "innovative products sales." Additionally, in the first paper, and to allow for a more meaningful interpretation of the interaction effect in logistic regressions, we complement our analysis by plotting the results of our significant interactions following a methodology by Norton, Wang, and Ai (2004). These authors have argued that the marginal effect of an interaction between two variables in a logit model is not simply the coefficient for their interaction, but rather the magnitude and sign of marginal effect can differ across observations (Norton et al., 2004). Their method helps to capture the "correct" effects of those interaction terms. However, it does not apply to models with squared interaction terms. Precisely, Norton et al. (2004) explain that using it would "yield the wrong answer" if a squared of an independent variable was included in a model. For this reason, in the second paper, to test our hypothesis on the moderating effect of the variable "decentralization" on the relationship between "non-family managers' ratio" and the family firm's innovation output (as we have theorized the presence of an inverted U-shaped relationship between the proportion of non-family managers and firm innovation), we have applied the guidelines described by Haans, Pieters and He (2016). Finally, in the third article, we also use the methodology proposed by Aiken and West (1991), and later extended by Dawson (2014). Furthermore, and due to the panel composition of ESEE data, and the binary nature of two dependent variables in our models, in this last paper we have estimated fixed-effects logit models, and in relation the variable measuring the number of product

innovations we have estimated a fixed-effects negative binomial regression. This is the result of a significant Hausman test verifying that fixed-effects models were more suitable than random-effects in our estimations. Finally, for each model we have also reported the change in the model fit using the change in the log-likelihood.

2.1. Essay 1: Owner Type and Innovation in European Firms: The Impact of Power Contingency

The first study tackles the challenges that various owners, e.g. a family owner, a holding firm and an industrial firm, may encounter while bringing their firms to achieve competitive advantage through innovation. Furthermore, and complying with a key proposition of corporate governance research from both agency theory and sociopolitical perspectives, we corroborate that "powerful organizational elites strategically respond to new logics, seeking to adopt structures that ostensibly conform, but which function in practice to promote the elites' own interests" (Joseph, Ocasio, & McDonnell, 2014). We offer a proposition that examines the impact of the power contingencies like an ownership concentration and the cultural power distance on the relationship between a specific owner type and a firm's innovation. We theorize that the impact of an owner's type on innovation is impacted by her power position within an organization. We access this power contingency within an organization from both the top-down and bottom-up perspective. That is, we argue that an owner with concentrated ownership should have a privilege over other firm's actors in terms of their impact on innovation, but also we claim that an owner's power position within an organization relates to the viewpoint of her subordinates on the unequal distribution of power. To measure these interdependencies, we have incorporated a measure of cultural power distance from two separate sources that have captured this phenomenon in the past: the Power Distance Index (PDI) by Hofstede (Hofstede, Hofstede, & Minkov, 2010; Varsakelis, 2001), and we use an additional measure of power distance provided by the Global Leadership and Organizational Behavior Effectiveness (GLOBE) study (House, 2004; Venaik & Brewer, 2008) for a robustness test of our results.

As defined by Hofstede, PDI determines the country-specific cultural dependence of the relationship between principal(s) and agent(s). It reflects the "extent to which the

less powerful members of institutions and organizations within a country accept that power is distributed unequally" (Hofstede et al., 2010). The GLOBE power distance includes the dimension of power distance, similarly to Hofstede's PDI, and measures the cultural differences that exist between different societies (House et al., 2004). In this line, employees, in a high power distance context develop, over time, develop a mindset of unwillingness to participate in decisions, and also those decisions related to innovation. This unwillingness differs among countries, and the higher the power distance between superiors and subordinates, the "greater communication gap between the superiors and their subordinates because it is very hard for the subordinates to air their ideas and views to managers" (Khatri, 2009), and also those ideas related to innovation. Thus, we corroborate that the lower the PDI in a particular country, the lower the adjustment cost an innovative organization needs to carry, and the more innovative it becomes.

Our findings reveal the positive impact of family ownership on a firm's innovation performance. We also find that the country-specific context and not the firm-level concentration significantly moderates the relationship between family ownership and the firm's level of innovation performance. More specifically, in a context of lower power distance, we can observe that the positive link between the family owner as a top shareholder and a firm's innovation performance is enhanced.

Our main contribution, beyond this robust finding on the positive impact of family ownership on innovation, is analyzing the owner's type effects of less explored but common owner's types like a holding firm or industrial firm, and also applying the indications of the agency theory in a context of power contingencies within a firm.

2.2. Essay 2: Non-Family Managers and Innovation in Family Firms: The Impact of Decentralization

Managers give the rhythm to any organization in terms of its dynamism and execution. Furthermore, managers hold a central role in the day-to-day struggle of implementing strategies, also those related to innovation. The unresolved tensions between organizational leaders (i.e., the owners and managers) can bring a firm to failure. In family firms those tensions can easily escalate, because the line between the role of a principal and the agent at the time of exercising ownership, control and management is

rather blurry (Kammerlander et al., 2015; Peng & Jiang, 2010). The owning families' aversion to sharing control over the family firm can substantially jeopardize a firm's growth and also its innovation. That aversion obstructs family owners and managers to delegate more responsibilities to the non-family related managers and employees. Recently, Bloom et al. (2012) discovered that, due to the importance of trust, the number of adult male family members was the key determinant of family firm size in India. They concluded that "owners trusted only other male family members to make major managerial decisions as they worried that outsiders would steal from the firm" (Aghion, Bloom, & Van Reenen, 2013; Bloom, Genakos, Sadun, & Van Reenen, 2012). This finding shows how severe the issues of delegating authority to the non-family workforce may become in family firms. In spite of the evidence that larger firms tend to implement the decentralized decision-making systems more often than their smaller counterparts, we have observed that over 23% of those small or medium-size European family firms in our sample do integrate decentralization in their decision-making systems. Decentralization, as we have defined it, means that managers can take some decisions in certain business areas, and that those decisions impact on company's strategies (Aghion, Bloom, Lucking, Sadun, & Van Reenen, 2015; Bloom, Sadun, & Van Reenen, 2010). Hence, we investigate how those managers, unrelated to the controlling family can act, given strategic decisive power, and if they are willing to further push family firm innovation.

The results of this study reveal that a non-linear relationship between the ratio of non-family managers and innovation in family firms does exist. We also show how the presence of decentralization can shift the turning point of this relationship, helping family firms to achieve higher innovative outcomes. More precisely, our main contribution in this study is that we extend the view on non-family managers through the lenses of the agency theory. We show that non-family managers can be both stewards and agents in a family firm. That is, the presence of non-family managers in family firms increases the innovative output in one hand. On the other hand, innovation is reduced for high levels in the proportion of non-family managers, which can most likely be due to the unfair redistribution of rents or the presence of a too-strict monitoring system in family firms.

2.3. Essay 3: Family Involvement and Innovation: The Capabilities' Paradox

The third study aims to uncover the root causes of family firm unwillingness to innovate. Family firms possess a continuum of capabilities that can help enhance their technological innovation. To analyze family involvement impacts a firm's capabilities and innovation, we use the capabilities framework developed by Teece, Pisano and Shuen (1997). This has also been further has been also further examined by Pisano (2016). As a result, we have considered different types of a firm's general-purpose and market-specific innovative capabilities to analyze how "the ability and willingness" paradox impacts the innovate outcomes in family controlled firms as compared to non-family firms. These capabilities are: (1) the capability to transfer and adopt knowledge, which as a "general-purpose" capability can be "deployed in a relatively broad range of uses and markets"; and (2) the technological capability, that as a "market-specific" capability captures "a degree to which knowledge is transferable across organizational tasks or contexts" (Pisano, 2016). Both have been shown to positively impact firm's innovation (Dosi, Faillo, & Marengo, 2008; García, Avella, & Fernández, 2012; Smith, Collins, & Clark, 2005; Szulanski, Ringov, & Jensen, 2016).

Our results reveal that the positive link between a firm's capability to transfer and adopt knowledge and innovation (i.e., product innovation, process innovation and number of product innovations) weakens with an increasing family involvement. However, we do not find the same result in terms of a family firm's technological capability and innovation. In fact, there we find that this positive link with product innovation is further strengthened at a higher level of family involvement.

This study extends, beyond the SEW preservation argument, the understanding of "the ability and willingness paradox" in a family firm's innovation. We show that the balance between ability and willingness to innovate in family firms is a combination of their ability and a controlling family's assessment on the superiority of this ability. That is, hiring a greater proportion of highly skilled employees (which also indicates that family owners are less loss-averse towards their SEW), does not necessarily lead to a higher willingness to innovate. The lack of trust in the superiority of this ability significantly harms a family firm's innovative outcomes. Beyond its academic contribution, our conclusions also inform family business practitioners about this circumstance of "mistrust" which triggers a family firm's unwillingness to innovate.

3. Conclusion and Future Directions

Our study contributes to a better understanding of the factors which trigger firm owners and managers to action and can help firms to thrive in innovation. As we have mentioned, our approach was to provide an inside-out perspective on the corporate governance issues and innovation in firms. Therefore, we have delved deeper into a specific type of ownership and management to tackle the innovation governance issues more concretely. We have assessed the role of top shareholder such as a family, a holding firm, and an industrial firm on a firm's innovation, and extending the view of the agency applied the notion of power contingencies on these relationships. Family firms that constitute a large portion of European economy have received our special attention. We have shown that non-family managers can be both stewards and agents in a family firm, and that decentralized decision-making system can help non-family managers to thrive in the setting of a family business and its socioemotional agenda. At last, we have also extended, beyond the SEW preservation argument, the understanding of "the ability and willingness paradox" in a family firm's innovation.

Nevertheless, we have encountered some limitation while applying methods in this study. One limitation relies on the usage of secondary data sources. For example, the EFIGE data is a cross-sectional data, and testing our hypotheses using longitudinal data could provide more insights. Both the EFIGE data and the ESEE data include a "slim" information about the controlling family. Finally, the ESSE data includes information solely about Spanish firms, and we believe that more detailed databases and further international comparisons could improve our understanding of the family firm's innovation paradox.

Finally, we encourage future research to explore further the topics of this study. An interesting path could be observing how owners behave when trying acquire more power, and what their "real" values rather than those espoused values are. In relation to the second paper, gathering information about the number or type of decisions that managers can take in those family firms could open a new venue for future research opportunity, to explore the "depth" of authority delegation inside family firms. Finally, in the third article exploring other ways of measuring a transferability of an "organizational knowledge" could improve our understanding of the family firm's innovation paradox.

4. References

Aghion, P., Bloom, N., & Van Reenen, J. (2013). 'Incomplete contracts and the internal organization of firms'. *NBER Working Paper No. 18842*.

Aghion, P., Bloom, N., Lucking, B., Sadun, R., & Van Reenen, J. (2015). 'Growth and Decentralization in Bad Times Preliminary'. *CEP Discussion Paper.*

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.

Alegre, J., & Chiva, R. (2008). Assessing the impact of organizational learning capability on product innovation performance: An empirical test. *Technovation, 28*(6), 315–326.

Altomonte, C., & Aquilante, T. (2012). The EU-EFIGE/Bruegel-Unicredit Dataset. *Bruegel Working Paper*, 13, 1–46.

Belloc, F. (2012). Corporate governance and innovation: A survey. *Journal of Economic Surveys, 26*(5), 835–864.

Bloom, N., Genakos, C., Sadun, R., & Van Reenen, J. (2012). Management Practices across Firms and Countries. *Academy of Management Perspectives, 26*(1), 12–33.

Bloom, N., Sadun, R., & Van Reenen, J. (2010). Does product market competition lead firms to decentralize? *American Economic Review, 100*(2), 434–438.

Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). The ability and willingness paradox in family firm innovation. *Journal of Product Innovation Management, 32*(3), 310–318.

Cruz-Cázares, C., Bayona-Sáez, C., & García-Marco, T. (2010). R&D strategies and firm innovative performance: A panel data analysis. *International Journal of Innovation Management, 14*(6), 1013–1045.

Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology, 29*(1), 1–19.

Dosi, G., Faillo, M., & Marengo, L. (2008). Organizational Capabilities, Patterns of Knowledge Accumulation and Governance Structures in Business Firms: An Introduction. *Organization Studies, 29*(8–9), 1165–1185.

Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Academy of Management Journal, 59*(4), 1224–1264.

Francis, J., & Smith, A. (1995). Agency costs and innovation: Some empirical evidence. *Journal of Accounting and Economics, 19*, 383–409.

García, F., Avella, L., & Fernández, E. (2012). Learning from exporting: The moderating effect of technological capabilities. *International Business Review, 21*(6), 1099–1111.

Gomez-Mejia, L. R., Makri, M., & Larraza-Kintana, M. (2010). Diversification Decisions in Family-Controlled Firms. *Journal of Management Studies, 47*(2), 223–252.

Haans, R. F. J., Pieters, C., & He, Z.-L. (2016). Thinking About U: Theorizing and Testing U- and Inverted U-Shaped Relationships in Strategy Research. Strategic Management Journal, 37, 1177–1195.

Hagedoorn, J., & Cloodt, M. (2003). Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy, 32*(8), 1365–1379.

Hitt, M. A., Hoskisson, R. E., Johnson, R. A., & Moesel, D. D. (1996). The Market for Corporate Control and Firm Innovation. *The Academy of Management Journal*, 39(5), 1084–1119.

Hofstede, G., 1980. *Culture's Consequences: International Differences in Work-related Values.* Sage, Newbury Park, CA.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). Cultures and Organizations, Software of the Mind: Intercultural Cooperation and its Importance for Survival. *McGraw Hill, 3rd Edition, 1*, 279.

Honoré, F., Munari, F., & van Pottelsberghe de La Potterie, B. (2015). Corporate governance practices and companies' R&D intensity: Evidence from European countries. *Research Policy, 44*(2), 533–543.

House, R. J. (2004) Preface. In R. J. House, P. J. Hanges, M. Javidan, P. W. Dorfman & V. Gupta (Eds.), *Culture, leadership, and organizations: The GLOBE study of 62 societies (pp. xxii-xxviii).* Thousand Oaks, CA: Sage.

Joseph, J., Ocasio, W., & McDonnell, M.-H. (2014). the Structural Elaboration of Board Independence: Executive Power, Institutional Logics, and the Adoption of CEO-Only Board Structures in U.S. Corporate Governance. *Academy of Management Journal, 57*(6), 1834–1858.

Kammerlander, N., Dessì, C., Bird, M., Floris, M., & Murru, A. (2015). The Impact of Shared Stories on Family Firm Innovation. *Family Business Review, 28*(4), 332.

Khatri, N. (2009). Consequences of Power Distance Orientation in Organizations. *The Journal of Business Perspective, 13*(1).

Kotlar, J., De Massis, A., Frattini, F., Bianchi, M., & Fang, H. (2013). Technology acquisition in family and nonfamily firms: A longitudinal analysis of Spanish manufacturing firms. *Journal of Product Innovation Management, 30*(6), 1073–1088.

Miller, D., Breton-Miller, I. Le, Corbetta, G., & Pittino, D. (2014). When do Non-Family CEOs Outperform in Family Firms ? Agency and Behavioral Agency Perspectives. *Journal of Management Studies, 51*(4), 547–572.

Munari, F., Oriani, R., & Sobrero, M. (2010). The effects of owner identity and external governance systems on R&D investments: A study of western European firms. *Research Policy, 39*(8), 1093–1104.

Norton, E. C., Wang, H., & Ai, C. (2004). Computing interaction effects and standard errors in logit and probit models. *Stata Journal, 4*(2), 154–167.

Peng, M. W., & Jiang, Y. (2010). Institutions behind family ownership and control in large firms. *Journal of Management Studies, 47*(2), 253–273.

Pisano, G. P. (2016). Towards a Prescriptive Theory of Dynamic Capabilities : Connecting Strategic Choice, Learning, and Competition. *HBS Working Paper 16-146*, (Draft 3.5). Retrieved from *http://hbswk.hbs.edu/item/towards-a-prescriptive-theory-of-dynamic-capabilities-connecting-strategic-choice-learning-and-competition*

Smith, K. G., Collins, C. J., & Clark, K. D. (2005). Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms. *Academy of Management Journal, 48*(2), 346–357.

Szulanski, G., Ringov, D., & Jensen, R. J. (2016). Overcoming Stickiness: How the Timing of Knowledge Transfer Methods Affects Transfer Difficulty. *Organization Science, 27*(2), 304–322.

Teece, D. J., Pisano, G. P., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509–533.

Thomsen, S., & Pedersen, T. (2000). Ownership Structure and Economic Performance in the Largest European Companies. *Strategic Management Journal, 21,* 689–705.

Varsakelis, N. C. (2001). The impact of patent protection, economy openness and national culture on R&D investment: A cross-country empirical investigation. *Research Policy, 30*(7), 1059–1068.

Venaik, S., & Brewer, P. (2008). Contradictions in national culture: Hofstede vs GLOBE. *50th Annual Meeting of the Academy of International Business* (AIB), 274–274.

PART II: ORIGINAL ESSAYS

Essay 1: Owner Type and Innovation in European Firms: The Impact of Power Contingency

Abstract

A growing number of studies have started to consider how differences in the owners' characteristics impact a firm's innovation. Most previous empirical evidence has focused on a single shareholder category – institutional investors – ignoring any other type of a top shareholder. This study examines the impact that an owner type (e.g., a family, a holding firm, an industrial firm) has on the innovation performance of European firms. Agency theory predicts that the extent to which an owner can impact a firm's strategy (and also a firm's innovation) depends on the power she can exercise towards other firm's actors. To capture this linkage, we explore the moderating effect of the power contingencies, like ownership concentration and the cultural power distance on the relationship between a specific owner type and the firm's innovation. We obtain two main results: first, a family owner as a top shareholder positively impacts on firm's innovation and, second, cultural power distance strengthens such positive link. We also find a size effect on the relationship between owner's type and innovation. That is, the differences in the characteristics of the owners appear to be more relevant in the context of European SMEs than in the case of larger European firms.

Keywords

Owner type; Power contingency; Product and process innovation

1. Introduction

We are living in an age of mass innovation where profit-generating innovations require the coordinated effort of various stakeholders. An organization's owner is a stakeholder who exerts a certain power along the whole life cycle of the venture –starting with its launch, its growth, and also in the declining phase. Such power often implies shaping strategies, including those related to innovation, and several scholars studying the impact of ownership on innovation have stressed its key function (Bong, Hee, & Williams, 2011; Miozzo & Dewick, 2002). However, these studies have provided mixed conclusions, finding either a positive, or a negative, or even a nonsignificant relationship between both variables. More precisely, one research stream suggests that organizations with concentrated ownership should have an innovation advantage (Belloc, 2012; Schumpeter, 1942), or that dispersedly owned firms tend to be less innovative (Francis & Smith, 1995). Another research stream argues that ownership concentration, or dispersion alone, does not play, by itself, a significant role in shaping a firm's propensity towards innovation, and introduces a more holistic approach to ownership by determining the owner type's impact on innovation (Choi, Park, & Hong, 2012; Munari, Oriani, & Sobrero, 2010). Also in this line, a growing number of studies have started to consider how the differences in the characteristics of the owners (Tribo et al., 2007, Hoskisson et al., 2002) moderate the relation between ownership structure and innovation. Nevertheless, most previous empirical evidence (Zahra, 1996; Bushee, B.J., 1998; Hoskisson et al., 2002) has focused on a single shareholder category – institutional investors – ignoring any other type of shareholders.

Undoubtedly, it seems reasonable to think that an owner plays an important role in shaping a firm's innovation strategy. However, and complying with a key proposition of corporate governance research, we corroborate that "powerful organizational elites strategically respond to new logics, seeking to adopt structures that ostensibly conform, but which function in practice to promote the elites' own interests" (Joseph, Ocasio, & McDonnell, 2014). Following this interest, this study examines the impact of power contingency on the relationship between a specific owner's type and a firm's innovation. We theorize that the impact of an owner's type on innovation is affected by her power position within an organization. We study this power contingency within an organization from both the top-down and bottom-up perspective. That is, we argue that an owner

with concentrated ownership should have a privilege over other firm's actors in terms of their impact on innovation, but we also claim that an owner's power position within an organization relates to the viewpoint of her subordinates on the unequal distribution of power. More precisely, the literature on international corporate governance shows an important variation by country in the relationship among ownership and firm performance (La Porta et al., 1999; Munari et al., 2010, among others). National culture could partially explain this variation and, in fact, some researchers indicate that the presence of a linkage between a society's cultural values and its ability to innovate (Taylor and Wilson, 2012; Vecchi and Brennan, 2009), and also those cultural values which relate to power distribution within a society (Hofstede, 1980). Following this approach, we aim to clarify whether the heterogeneity of European firms' innovation performance can be explained by their owner's type, and see what role the power contingencies that relate to an ownership concentration and a cultural power distance play in moderating the owner's attitude towards innovation.

To achieve this, first we examine what impact a specific top shareholder type – a family owner, a holding firm, an industrial firm – has on European firm's innovation. Second, we test what moderating influence has of a firm's ownership concentration on the relationship between a specific owner type and innovation. Third, we consider the moderating effect of a cultural power distance on these relationships. To ascertain the bottom-up power contingency in our models, we have included a measure of cultural power distance that capture this phenomenon: the Power Distance Index (PDI) by Hofstede (Hofstede, 1980; Hofstede, Hofstede, & Minkov, 2010; Varsakelis, 2001).

As defined by Hofstede, the PDI determines the country-specific cultural dependence of the relationship between principal(s) and agent(s). It reflects the "extent to which the less powerful members of institutions and organizations within a country accept that power is distributed unequally" (Hofstede et al., 2010). Specifically, a low PDI score means that power is distributed fairly in a society, and superiors tend to delegate some responsibility to their inferiors, whereas a high PDI score implies the presence of hierarchical systems with inherent inequalities, where leaders play an autocratic role by solely giving orders to their subordinates.

In summary, the relationship between ownership and innovation has been broadly debated but the picture remains still incomplete. Beyond analyzing the impact of a top

shareholder like a family, a holding firm, or an industrial firm on a firm's innovation, we also examine the moderating effect of power contingencies on these relationships. Our main contribution here is to examine the owner's type effects of types so far barely explored but common, like a holding firm or industrial firm, also applying the indications of the agency theory in a context of power contingencies within a firm.

The remaining part of the paper is organized as follows. Section 2 develops our theoretical model. Section 3 presents our data and in while section 4 we show our empirical findings. Section 5, discusses these findings, and we conclude in Section 6 discussing and identifying some limitations of this study and avenues for future research.

2. Theory and Hypotheses

2.1. Owner Type and Innovation

Much of our understanding of ownership in firms builds on the idea that owners monitor and incentivize managers to pursue their goals in line with shareholders' interests (Fama & Jensen, 1985). Previous studies have shown that firms with concentrated ownership perform better because concentration provides an efficient way of resolving agency problems (Claessens & Djankov, 1999; Prowse, 1992; Shleifer & Vishny, 1997). In fact, concentrated ownership is important to the innovation activity as it provides an effective monitoring mechanism (Belloc, 2012; Bong et al., 2011; Choi et al., 2012). Large shareholders can monitor and influence management means by voting control or because principals have the willingness and ability to persuade their managers to prioritize the maximizing of shareholders' value above their own interests. As innovative firms tend to have a higher value than their non-innovative counterparts, owners are likely to favor innovation within their firms. Presumably, those organizations owned by a top shareholder with a concentrated ownership can deal more effectively with short-termism pressure, and they are capable of successfully implementing innovative projects in line with the firms' long-term vision (Minetti, Murro, & Paiella, 2015). The above description of the agency problem, however, considers all principals uniformly. The presence of significant differences between the owners' types might affect the agency problem previously discussed. For example, a principal who favors innovation can use his own ability to monitor and incentivize managers in promoting innovative

projects. Indeed, different types of owners may differ with respect to investment horizons, risk aversion, diversification plans, and return aspirations (Thomsen & Pedersen, 2000). Not only that, they may also have different preferences with regard to a firm's R&D and the technological innovation activities (Hoskisson, Hitt, Johnson, & Grossman, 2002). To tackle this concern, we explain the top shareholders' diversity in terms of their typical features, that shape how each top stakeholder relates to firm decisions about innovation and the control over resources.

Family Ownership

Family firms constitute a large portion of the value created in almost any economy, but the relationship between innovation and family ownership is unclear. Previous scholarly research has shown that family firms differ in terms of innovation performance when compared with non-family firms (De Massis, Frattini, & Lichtenthaler, 2012). On one hand, family firms due to their long-term investment horizon have been shown to have a different rate of disruptive innovations (De Massis et al., 2012). On the other hand, family owners tend to be overly concerned about the family firm's reputation, and have a myopic view on the risk associated with a failure (Chrisman & Patel, 2012), which may lead them to disregard promising innovations. Therefore, previous scholarly research had assumed that family firms bring fewer product innovations to market (Hatak, Kautonen, Fink, & Kansikas, 2016) and make little investment in new technologies (Block & Jaskiewicz, 2007; Chrisman & Patel, 2012; Kotlar, De Massis, Frattini, Bianchi, & Fang, 2013). In addition, family firm owners have been shown to be oversensitive to uncertainty, and strive to preserve the socioemotional wealth (SEW) (Gomez-Mejia, Takács Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007).

However, there are reasons to doubt that family firms are less innovative. A more recent literature stream supports the view that kinship binds family workforce and narrows down information asymmetries between owners and managers in family firms (Karra, Tracey, & Phillips, 2006; Mcguire, Cunningham, Seaman, & Mcguire, 2016). Furthermore, the organizational goals pursued within family firms like long-run investment horizon, or firm reputation, have been shown as important determinants of innovation (De Massis, Kotlar, Frattini, Chrisman, & Nordqvist, 2016).

In a recent HBR article Kammerlander and van Essen (2017) refer to a number of cases where family firms do innovate and use their shareholder features to invest in the right projects in a more effective way than other firms. Although this is not true for all family firms, certain CEOs of family firms and the use of family culture to empower employees may payoff in terms of innovation. The same two authors along with Duran and Zellweger carry out a meta-analysis of 108 empirical studies from 42 countries that they unequivocally title as "Doing more with less: Innovation input and output in family firms" (Duran, Kammerlander, van Essen, & Zellweger, 2016). There they show how family firms can be more efficient in their use of resources. These authors describe how, from a resource-based view (RBV), family ownership can provide valuable resources which relate to a given family and its organizational processes (Barney, 2001; Habbershon & Williams, 1999). The RBV claims that "familiness" provides a firm with a unique bundle of complex, intangible and non-substitutable resources (Barney, 2001) which may help a family to balance out those harming agency issues and foster its innovation. Scholars point out on the importance of "familiness" in the family firm's resource portfolio (Hatak, Kautonen, Fink, & Kansikas, 2016). Accordingly, it has been shown to determine the strategic behavior of family firms (Chrisman, Chua, De Massis, Frattini, & Wright, 2015; Habbershon & Williams, 1999), and also their attitude towards innovation (Carney, 2005).

For all those reasons, we argue that family owners may provide key resources to innovation, such as financial capital invested without threat of liquidation for long periods, or other resources that might provide a competitive advantage (Munari et al., 2010; Sirmon & Hitt, 2003). Hence, family firms oriented towards the firm's long-term growth can be very effective in their innovation efforts (Matzler, Veider, Hautz, & Stadler, 2015). As a result, we theorize:

H1. A family owner as a top shareholder positively affects a firm's innovation performance.

Holding Firm as a Top Shareholder

The practice of incorporating a holding firm as a top shareholder has a long history in Europe (Van Hulle, 1998). A holding company is defined as a company that owns other companies' outstanding stock. Typically, a holding firm is closely related to its parent

company, and aims to get the majority of shares in the group of subsidiary companies with related business activities. Its presence helps spread out the risks carried by an individual owner and allows for ownership and control over a number of companies. As a top shareholder, a holding firm may transfer financial and tangible resources from the parent company to promote innovation (Almeida, Park, Subrahmanyam, & Wolfenzon, 2011; Banerjee, Leleux, & Vermaelen, 1997). To increase the principal firm's value, a holding company is likely to share with the parent company the knowledge of the outcomes of those innovative projects carried by a subsidiary firm, and the other way around. Such a technological knowledge spillover can effectively enhance the innovation performance of both the subsidiary firm and the parent company. Hence, we propose:

H2. A holding firm as a top shareholder positively affects a firm's innovation performance.

Industrial Firm as a Top Shareholder

According to resource dependence theory as well as industrial organization economics (e.g., Pfeffer & Salancik, 1978; Porter, 1979), an industrial firm as a top shareholder is seen to operate limited by its administrative boundaries, within a rigid hierarchical structure and with slower decision-making processes (Kor & Mahoney, 2004). A complex bureaucratic structure has been shown to significantly increase the costs of its operations and managerial systems within a firm. Nevertheless, an innovation (regardless its type like incremental, progressive or radical) requires continuous adjustments of organizational processes. As a result, a slight organizational change can become too costly for the industrial owner, who thus tends to dismiss effortful innovation. Despite the fact that an industrial firm as a top shareholder may possess resources to become innovative, we argue that due to the path dependence it will not be willing to use those resources outside of known patterns. Therefore:

H3. An industrial firm as a top shareholder negatively affects a firm's innovation performance.

2.2. The Moderating Effect of Power Contingency

Some scholars in the field of corporate governance show that "agency theory fails to sufficiently explore how corporate governance is shaped by its institutional

embeddedness" (Aguilera & Jackson, 2003). They claim that the evaluation of ownership should move from the currently predominant consideration of structural characteristics to a more contextualized approach that takes into account not only institutional characteristics of an organization but also firm contingencies (Aguilera & Jackson, 2003; Krause, Filatotchev, & Bruton, 2016).

Building on this literature, we contend that the interaction between principals and agents does not remain the same in different contexts and environments. Agency theory suggests that high level of ownership concentration is an effective mechanism to reduce agency costs and improve innovation performance. We extend this view, arguing that ownership concentration plays a moderating role rather than determining firm's innovation performance (Thomsen & Pedersen, 2000). For example, in continental Europe, organizations tend to be owned by large blockholders that present a long-term strategic focus on their firms' growth, whereas those organizations coming from the Anglo-Saxon model tend to have a more dispersed ownership structure and a short-term goal of maximizing shareholders' value. Regardless of the presumption about the innovative superiority of narrowly held firms, the organizations coming from the Anglo-Saxon model have shown their ability to innovate successfully (Bingham, Eisenhardt, & Furr, 2007; Munari et al., 2010; Tylecote & Ramirez, 2006). Hence, we have reasons to believe that ownership concentration strengthens each owner's individual resource dependence purposes and interests, which can either enhance or harm a firm's innovation performance. As a result, we hypothesize:

H1.1. Concentration strengthens the positive link between the family owner as a top shareholder and a firm's innovation performance.

H2.1. Concentration strengthens the positive link between a holding firm as a top shareholder and a firm's innovation performance.

H3.1. Concentration strengthens the negative link between an industrial firm as a top shareholder and a firm's innovation performance.

An innovation is a change, and each change carries with it adjustment costs (Honoré, Munari, & van Pottelsberghe de La Potterie, 2015; Varsakelis, 2001). These costs vary in relation to innovative activities, and at a certain point in time need to be settled. In other words, adjustment costs are the costs of altering the level of output, and they increase

when a firm implements a new or significantly improved product or process. This increase triggers a transformation within an organization, bringing the uncertain and new into the daily routine of the owners, managers, and employees. Furthermore, the more innovative a firm, the higher the adjustment cost it needs to carry, because innovative projects may lead to either success or failure. To assess the adjustment costs' impact on a firm's innovation at the level of a specific country, we use the proposition of cultural power distance by Hofstede and the GLOBE study.

According to Hofstede, employees' willingness to adapt to an innovative change relates to their individual attitude, which is determined by a national culture. He argues that individuals, since their early childhood, have been exposed to values, beliefs, and assumptions cultivated in their society (Hofstede et al., 2010; Van Der Vegt, Van De Vliert, & Huang, 2005; Varsakelis, 2001). Individuals internalize their national culture, which later resonates in their intrinsic motivation and in the choices they make throughout their lives. Thus, the adjustment cost is estimated within the context of a national culture, and the higher the adjustment cost, the lower the individual's willingness to adapt to changes, including those caused by innovation. Hofstede constructed the Power Distance Index (PDI) to measure this phenomenon. The PDI is one of Hofstede's core dimensions of national culture, and reflects "the collective software of mind" (Hofstede et al., 2010) that characterizes a specific group or category of people. Members of such a group interact, within their group or between groups, in line with learned patterns facilitated by their national culture. Despite the time flow, distances between cultures remain, i.e., "the way in which one society behaves, how it perceives the future and how it considers the relationships between its members" (Hofstede et al., 2010). Low and high PDI countries present hierarchies in which leaders and followers play a certain role (Hofstede et al., 2010). Subordinates from low PDI societies, however, adapt more quickly to changes, identifying system shortcomings and proposing improvements, whereas those from high PDI societies avoid changes, transferring the responsibility for any system failures to their superiors. Hence, national culture proves to be a factor explaining innovation at a country level. More precisely, the lower the PDI in a particular country, the lower the adjustment cost an innovative organization needs to carry, and the more innovative it becomes. Therefore, we hypothesize:

H1.2. Low cultural power distance strengthens the positive link between the family owner as a top shareholder and a firm's innovation performance.

H2.2. Low cultural power distance strengthens the positive link between a holding firm as a top shareholder and a firm's innovation performance.

H3.2. Low cultural power distance weakens the negative link between an industrial firm as a top shareholder and a firm's innovation performance.

Insert Figure 1 about here

3. Data

3.1. Sample

This study analyzes how an owner's type impacts a firm's innovation, and how ownership concentration and cultural power distance moderates this relationship. We use the EU-EFIGE/Bruegel-UniCredit dataset (hereinafter referred to as the EFIGE dataset), which includes information about firms from Austria, France, Germany, Hungary, Italy, Spain, and the UK. The data were collected within the "European Firms in a Global Economy: Internal Policies for External Competitiveness" (EFIGE) project carried out from September 2008 to August 2012. It was supported by the Directorate General Research of the European Commission through its 7th Framework Program (Altomonte & Aquilante, 2012).

The EFIGE data provide comparable and consistent cross-country information on the characteristics of ownership structure and innovation among European firms. The information collected is cross-sectional for the budget year 2008. The EFIGE dataset is truncated to prevent firms' identification with categorized industry sectors by NACE2. The total sample includes 14,759 individual observations. For the purpose of our analysis, we excluded those European firms that reported being owned by a foreign top shareholder. Our final sample consists of 12,936 observations. In addition, we use Hofstede's Power Distance Index (PDI), available in the Values Survey Module 2013 (VSM 2013) dataset, interchangeably with the power distance measure of the Global Leadership and Organizational Behavior Effectiveness (GLOBE) Phase 2 2004 dataset.

3.2. Variables

3.2.1. Dependent Variables

In the literature, there exists a variety of innovation types, from the incremental and radical, through close and open innovation, to iterative and disruptive innovation (Christensen & Overdorf, 2000; Gómez & Vargas, 2012; Park, 2014). Previous research tested measures like product innovation (and multiple product innovations) (Hagedoorn & Cloodt, 2003), or process innovation (Cruz-Cázares, Bayona-Sáez, & García-Marco, 2010), or innovative products sales (Hitt, Hoskisson, Johnson, & Moesel, 1996) to access a firm-level innovation performance. In addition, the Oslo Manual (2005) provides a widely accepted definition of technological product and process innovation. As defined, technological innovation is made up of product innovation and process innovation, and the degree of novelty of the change introduced in each case (OECD/Eurostat, 2005). To measure a European firm's innovation performance, we use two binary variables labeled the "product innovation" and "process innovation". The variable "product innovation" takes the value 1 if an organization reports having introduced a good that is new or significantly improved to the firm, and 0 otherwise. "Process innovation" takes value 1 if an organization declares a new production technology which is either new or significantly improved in the context of the firm, and 0 otherwise. Additionally, we use a measure labeled "innovative products sales" which captures the European firm's average percentage of turnover from innovative products sales. It is a continuous variable and can take values between 0 and 100

3.2.2. Independent Variables

We capture the ownership construct of European firms by their owners' type. In our models we include three binary variables that measure different types of top shareholders as reported in the EFIGE survey. First, the variable "family ownership" takes value 1 if an organization reported being owned by an individual top shareholder related to a controlling family, and 0 otherwise; second, the variable "holding firm" takes value 1 if a firm reported a holding firm as a top shareholder, and 0 otherwise and, finally, the variable "industrial firm" takes value 1 if a firm reported being owned by an industrial firm as a top shareholder, and 0 otherwise. Other top shareholder types reported in the EFIGE survey correspond to an institutional ownership, a venture capital,

a state ownership, or other top shareholder type. However, due to representativeness issues, they were not included in our models, and serve as a baseline group.

3.2.3. Moderating Variables

We examine the moderating effect of power contingencies on an owner's type and innovation. To capture both the top-down and bottom-up power independencies in European firms, we use two different moderating variables in our models. First, the variable "concentration" captures the ownership concentration. It indicates the percentage of shares owned by a top shareholder for each firm in the sample, and can take values from 0 to 100. The higher the percentage of shares owned by a top shareholder, the more concentrated the ownership within the firm.

To measure the power contingency on the relationship between an owner's type and innovation as perceived by a firm's subordinates, we applied a country-level Hofstede's Power Distance Index (PDI) in our models. PDI is "a measure of the interpersonal power or influence between the superior and subordinate, as perceived by the subordinate, the less powerful of the two" (Hofstede et al., 2010). Hofstede's PDI is a 100-point scale, with higher values indicating greater cultural power distance. Specifically, for countries from our sample we have used the PDI as quantified by Hofstede and presented in the table 1. As assessed by Hofstede, Austria is the country with the lowest PDI worldwide. Other countries like Germany, Hungary, Italy, and the UK are categorized medium-low PDI, whereas France and Spain belong to the group of medium-high PDI, representing the highest power distance between superiors and inferiors within their organizations as to comparing to power distance of other firms. In our sample we do not have any organizations with high PDI, i.e. above the value of 75. Typically, such high score correspond to organizations from less developed economies. Previous scholars argued that out of the four initial cultural dimensions suggested by Hofstede (1980), the dimensions of power distance and individualism seem most central in relation to innovation management (Rosenbusch, Brinckmann, & Bausch, 2013). Furthermore, it has been shown that the concepts of power distance and individualism are highly interrelated. We focus on one of the two dimensions – power distance – to capture the notion of the power as perceived by a firm's subordinates.

In addition, we use the GLOBE power distance scale to validate our results on the moderating effect of power distance on the relationship between ownership structure and innovation. The GLOBE study develops cultural dimensions across both actual society practice ("As Is") and values ("Should Be") in the different cultural settings. It captures a cultural power distance that is modeled on Hofstede's PDI, but it is based on a different survey and population. The GLOBE measure of cultural power distance is also provided on a different scale than Hofstede's PDI, but it captures the same phenomenon of low and high power distance societies. A comparative analysis between Hofstede's PDI and the GLOBE power distance instrument found that there is a significant positive correlation with Hofstede's PDI and the GLOBE power distance practices, but not with GLOBE power distance values (Venaik & Brewer, 2008). We use the GLOBE power distance practices in our models as it reflects "As Is" in the settings of different cultures, in contrast to the "Should Be" of the GLOBE power distance values. The GLOBE power distance practices are based on a 7-point scale, with higher values indicating greater cultural power distance. Specifically for the countries in our sample, it takes the following values: Austria, 5 points; the UK, 5.26 points; Italy, 5.45 points; Germany, 5.48 points; Spain, 5.53 points; Hungary, 5.57 points; and France, 5.68 points. We use the GLOBE power distance to test the robustness of our estimation models.

Insert Table 1 about here

3.2.4. Control Variables

Control variables in our models include measures if a firm belongs to a group, bank debt, R&D expenses, activity abroad, market competition, firm size, and firm age. Previous research uses a control variable "business group" to capture for externalities that can impact a firm's top shareholder. An owner of a single firm may not show the same attitude towards a firm's innovation performance as opposed to an owner of a conglomerate. We control for this effect in our model by including the variable "business group" that capture if a firm belongs to a national or foreign group. Moreover, as the EFIGE data has been collected with an aim to capture those changes the European firms' structure which occurred as a result of the 2007-2008 financial crisis. We add a variable "bank debt ratio" to discount for this event in our models. It captures a firm's share of bank debt over the total external financing, and can take values between 0 and 1.

Previous evidence shows that there exists a complementarity between internal R&D and external knowledge acquisition (Cassiman & Veugelers, 2006). Nevertheless, firms that do in-house R&D are more likely to innovate and to have a higher probability of being able to absorb external know-how effectively. For this reason, we also have included a continuous variable "R&D share" in our models. It takes values between 0 and 100 corresponding to family firm's R&D expenses as percentage of the firm total turnover in 2008. Furthermore, firms exposed to international markets are more likely to innovate. We expect that firms active abroad are more likely to engage in product and process innovation. By active abroad, we mean when a firm engages in activities related to exports or imports (either nearby or to a global market), or when a firm reports having production activity contracts and agreements abroad, or when a firm is running at least part of its production activity in another country via direct investments. Hence, we include a dummy variable "active abroad" that takes the value 1 when a firm reports having engaged in at least one of the activities listed above, and 0 otherwise. The presence of competition has also proven to affect innovation. For this reason, we include a dummy variable "competition" that takes the value 1 when a firm reports having competition from abroad, and 0 otherwise. Previous research has also suggested that firm size and age could affect the likelihood of innovation, i.e., larger and younger firms are usually more likely to introduce both product and process innovation. We include a continuous variable of firm size that indicates the total number of employees in a family firm in a respective home country in 2008. Finally, the variable 'firm age' captures the number of years a firm operates in a respective market. Both variables firm size and firm age enter our models in a log-linear form due to skewness of their distribution. Finally, we include a set of dummy variables that take a value of 1 for each sector (at NACE 2 digit levels), and all countries considered in the EFIGE sample. Table 2 presents the descriptive statistics and table 3 a correlation matrix. Table 3 also shows that the VIF scores for all our variables are below 2.6. Thus, indicating that multicollinearity is not a problem in our models.

Insert Table 2 about here

Insert Table 3 about here

3.3. Descriptive Statistics

Over 48% of European firms in our sample reported innovating in products, whereas over 43% innovating in processes. European firms also reported having 9.78 average percentage of turnover coming from their innovative products sales. In relation to owner type, over 64% of European firms reported being owned by a family, over 3.5% by a holding firm, and over 3.2% by an industrial firm. Furthermore, more than 66% of innovative European SMEs reported a top shareholder as a family owner, whereas larger and innovative firms in Europe reported other top shareholder types more frequently; for example, over 12% of European firms reported a holding firm ownership, and more than 10% of European firms reported an industrial firm as a top shareholder. In relation to ownership concentration, a top shareholder tends to own more than 65% of shares on average. Larger, innovative European firms have a more concentrated ownership (by over 12% more of the shares owned by a top shareholder) than innovative European SMEs. Assessing the impact of Hofstede's PDI and the GLOBE power distance on innovation of firms in our sample, we see that more innovative European firms on average operate in countries with a lower cultural power distance.

Finally, innovative European firms tend to report belonging to a business group, a higher bank debt ratio, and on average more R&D expenses, more activities abroad and more competition. Those innovative European firms also tend to be larger and older than their non-innovative counterparts. However, that difference in firm age appears non-significant after the sample of European firms has been split by firm size. Table 4 presents the descriptive statistics comparing those innovate European firms versus those that do not report innovating in products and processes, and also when dividing the sample between those smaller and medium firms (up to 249 employees) and larger firms (more than 250 employees). Additionally, table 16 of the appendix provides a description of all the variables used in our models.

Insert Table 4 about here

4. Method and Results

The focus of this paper is the estimation of a firm's probability of achieving a technological innovation. In line with a statistical practice of modeling binary dependent variables, we use logistic regression in our estimation models. To estimate the

moderating effect of power contingencies on the relationship between an owner's type and innovation, first, we follow the methodology by Aiken and West (1991). Second, we complement our analysis by plotting the results of our significant interactions following a methodology by Norton, Wang, and Ai (2004). The variables were centered on the mean before calculating the interaction terms, in order to avoid problems of multicollinearity among the variables in the regression equation.

Insert Figure 1 about here

4.1. Logit Results and Marginal Effects

This section provides an overview of the results of the impact of owner's type on innovation in European firms. We also present the results of the specifications on the moderating effect of power contingencies on this relationship. Model 1 presents the control variables and the moderators (PDI and concentration). Model 2 shows the results of a direct impact of a specific owner's type (i.e., a family owner, a holding firm, or an industrial firm) on innovation. Model 3 includes the effects of interaction term between an owner's type and concentration, whereas model 4 the effects of interaction term between an owner's type and Hofstede's PDI. Finally, model 5 presents the effects of interaction terms between an owner's identities both moderators.

In relation to various owner's identities, the results of our specifications show, as theorized, a positive and significant impact of family ownership on all innovation types in European firms. More precisely, firms reporting a "family ownership" as a top shareholder show a higher probability of innovating, and this probability increases by 5.1 percentage points in relation to their product innovation, by 3.3 percentage points in relation to their process innovation, and the coefficient of the impact of the "family ownership" on "innovative products sales" ($\beta = 0.860$) is statistically significant at the 0.05 level. In addition, we also found that the coefficient of the impact of the "industrial firm" on a firm's "product innovation" ($\beta = - 0.253$) is statistically significant at the 0.05 level.

Assessing the moderating effects of power contingencies on an owner's type and a firm's innovation, we do not find a supporting evidence for our hypotheses on the impact of concentration on those relationships, but we find that Hofstede's PDI plays an important role for those firms owned by a family as a top shareholder. That is,

Hofstede's PDI has a significant moderating impact on the relationship between a "family ownership" and a firm's innovation performance. This result is robust across all our models.

Insert Table 5 about here

Insert Table 6 about here

Insert Table 7 about here

To allow for a more meaningful interpretation of the interaction effect of Hofstede's PDI on the relationship between a family as an owner type and all types of innovation, we also present graphic representations of these relationships. The marginal effect of an interaction between two variables in a logit model is, however, not simply the coefficient for their interaction, and the magnitude and even the sign of marginal effect can differ across observations. Norton et al. (2004) argued that the interaction effect in those models depends on other covariates. That is, the magnitude of effect and the statistical significance can range widely between various observations. Hence, we also apply the interaction term's interpretation that access the mean effect of the interaction term together with its significance level as suggested by Norton et al. (2004) (*see table 8*)[1]. We also show the graphics for the interactions on the impact of Hofstede's PDI and the "family ownership" on a firm's product innovation and process innovation (*see figure 2*).

More precisely, for European firms owned by "family owner" the mean interaction effect on their "product innovation" is positive (0.00149) and significant. For those firms with a predicted probability to innovate of around 0.5, the interaction effect between "family ownership" and PDI is positive, but decreases when the cultural power distance increases (*see figure 2, graph 1*). In terms of the significance of the interaction effects, for European firms whose predicted probability is above 0.5, most observations have statistically significant interaction effects (*see figure 2, graph 2*). In relation to the interaction effect of the "family ownership" and Hofstede's PDI on the European firm's "process innovation," we found a positive and significant mean interaction effect (0.00147). Again, we observe that for those firms with a predicted probability to innovate of above 0.5, the interaction effect between "family ownership" and PDI is

[1] To preserve space the graphical representation of the estimation models with non-significant mean interaction effects are not shown here, but can be provided upon request.

positive, but decreases when the cultural power distance increases (*see figure 2, graph 3*). Similarly, we find mostly significant observations for European firms whose predicted probability is above 0.5 (*see figure 2, graph 4*).

Insert Figure 2 about here

Insert Table 8 about here

4.2. Robustness

Several models have been developed to explore differences between cultures, and the Hofstede model has been applied the most (Shi & Wang, 2011). The GLOBE study was conducted to expand on Hofstede's work (1980), and some of their nine societal scales share the same labels, e.g., power distance. In contrast with Hofstede's dimensions, the nine GLOBE dimensions were measured twice, as practices and values, respectively. Two forms of questions for each dimension were asked to the respondents, i.e., (1) to measure managerial reports of actual practices in their organization and managerial reports of what should be (values) in their organization, and (2) to measure managerial reports of practices and values in their societies (Shi & Wang, 2011). The GLOBE scale was designed to reflect the same constructs as Hofstede's dimensions Power Distance Index (PDI). For this reason, in this study we use the GLOBE power distance dimensions to test the robustness of our estimation models by replacing Hofstede's PDI with the GLOBE practices of power distance for all countries considered in our sample.[2] Table 9 of the appendix presents results of robustness specifications using the GLOBE power distance measures. Model 1 and model 2 present the results of the estimation for "product innovation", model 3 and model 4 for "process innovation", whereas model 5 and model 6 for a firm's "innovative products sales". All estimations, first, present the effects of interaction term between an owner's type and the GLOBE power distance, and second, the effects of interaction terms between an owner's type and both moderators – concentration and the GLOBE power distance.

The positive link between a "family ownership" and innovation performance proves to be consistent in all estimation models, i.e., testing the direct impact of a family on innovation, as well as, the moderating effect the GLOBE power distance on this

[2] Although Germany within the GLOBE study has been measured twice as Germany-East and Germany-West, we use the score corresponding to Germany-West, utilizing the Hofstede study's criteria.

relationship. Again, we find a negative and significant impact of an "industrial firm" as a top shareholder on a firm's "product innovation". Hence, our results are robust across models.

Insert Table 9 about here

Finally, we also test how firm size relates to owner's type, its power contingencies and a firm's ability and propensity to innovate. Tables 10-12 of the appendix show the results of our estimation for the European SMEs, whereas tables 13-15 for those large European firms. Our results reveal that owner's type are relevant in the context of product innovation in European SMEs. That is, we find a significant and positive impact of a family owner and a holding firm as a top shareholder, and significant and negative impact of an industrial firm as a top shareholder on those firm's product innovation. In addition, we find that the positive impact of a family owner on a firm's innovation performance appears to play a significant role in terms of a small and medium sized firm's process innovation and innovative products sales. Finally, we also find a significant moderating effect of Hofstede's PDI on "family ownership" and all types of innovation in those European SMEs. However, we do not find significant results for these relationships in large European firms. It may be due to the power failure of our sample size for large firms which undermines this effect.

Insert Table 10 about here

Insert Table 11 about here

Insert Table 12 about here

Insert Table 13 about here

Insert Table 14 about here

Insert Table 15 about here

5. Discussion

A combination of firms' features like owner's type and power contingencies, and firm size, when considered together, help provide a better understanding of the observed heterogeneity in innovation performance across European firms. The main contribution of this study is a robust finding on the positive impact of a family ownership on a firm's innovation performance. We also find that a country-specific context and not the firm-level concentration significantly moderates the relationship between a family ownership

and the firm's level of innovation performance. More specifically, in a context of lower power distance, we can observe that the positive link between the family owner as a top shareholder and a firm's innovation performance is enhanced. This is reflected in a much higher probability to innovate by those firms owned by a family owner in a lower power distance context. It might be that, due to a family owner's socioemotional wealth perspective, there exists a tendency of family owners establishing closer relationships with those employees that act proactively (also in terms of engaging in innovation). On the other hand, we might have not found any effect of concentration on the relationship between a family owner and innovation, because we cannot precisely distinguish the class of shares owned by top shareholders, a feature that would determine their voting rights.

6. Conclusion

The European firms' sources of competitive advantage should be found in their recognition of the need of creating new patterns to action, the development of organizational competence, and their appropriate use in daily operations, i.e., product and process innovation. Furthermore, by adopting innovations, firms' operational and administrative processes become affected and they may get modernized too (Wischnevsky, Damanpour, & Mendez, 2011). In any case, a profitable innovation requires coordinated effort among various stakeholders, and owners could be key to this coordination.

In this study, we have tried to answer the question of whether an owner's type can drive innovation and, if so, how and what factors can enhance innovation by alleviating agency costs. According to previous research, one of these factors could be the cultural power distance, as proposed by Hofstede and the GLOBE study. Both works measure the power distance between superiors and inferiors at the country-specific level, and this power distance moderates the perceptions of individuals, or groups of individuals, and their decision making and behavior throughout an extended period of time. Countries with a national culture expressed by lower PDI are more system-fixing oriented and, any time that something gets wrong, either product or process, they invest in new technologies in order to fix the system. In addition, those European firms with standardized regulations and common innovation routines have a higher ability to spot

innovation failures early on, mitigating the corresponding risks, and better capturing the profits generated by an innovation. Managing the positive and negative effects caused by long-lasting organizational changes through innovative activities, an organization can further encourage its employees' openness and flexibility to these changes. As a consequence, those firms gain the first-mover advantage, in bringing the innovation outcomes to the market more quickly than their competitors. Such an innovation management, where the adjustment costs are effectively handled, fostering a firm's innovative success, is the mark of good governance in an organization. In addition, we contribute to the firm size debate over innovation in firms. Our findings show that in cultures characterized by lower power distance, firms' owners, managers and employees develop a mindset of willingness to promote innovation.

A limitation of this study is the use of the Hofstede's PDI and the GLOBE power distance to measure a cultural power standpoint of the subordinates in European organizations. Some critical views, on both Hofstede and the GLOBE study, argue that their scales may be assessing unfounded stereotypes rather than objective features of the society (Shi & Wang, 2011). Hofstede himself noted that "distinctions derived from comparing collective trends in respondents' answers across countries did not necessarily make psychological sense at the individual level" (Hofstede et al., 2010; Shi & Wang, 2011). In addition, other scholars have highlighted the existence of paradoxes in cultural behavior that cannot be explained by sophisticated stereotyping. Trying to acquire more power or influence, individuals may not always behave in line with their espoused values, but rather with their real values (Oslond & Bird, 2000). Nevertheless, this study has focused on capturing the effect of a specific level of cultural power distance on innovation in European countries and not the individual's deviant behavior.

Another limitation of this study relates to the cross-sectional nature of our data. The use of longitudinal data can provide more insights concerning the relationship between ownership structure and innovation in European firms. Finally, we have made rather generic assumptions about the impact of family owners on the innovation of European firms. To better understand the effect of a family on the family business, we consider it important to explore EFIGE data further.

Figure 1: Research model

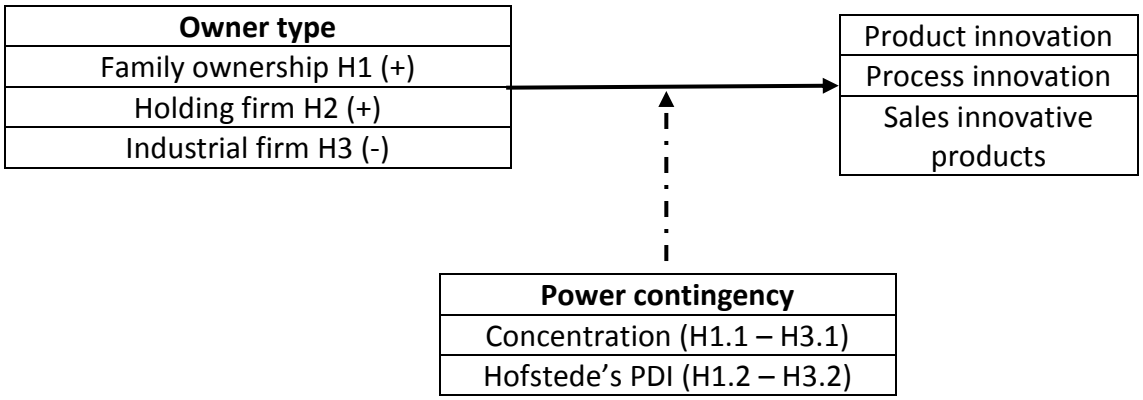
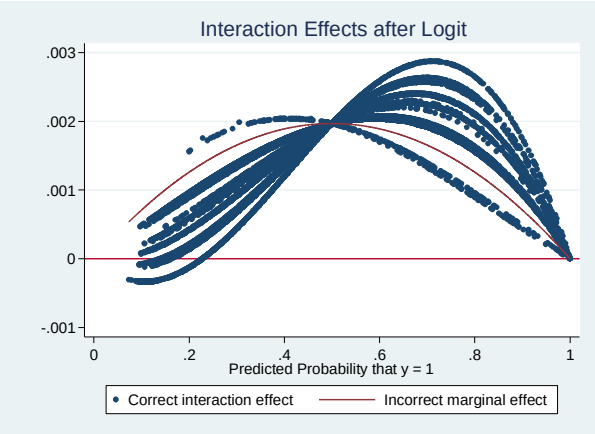
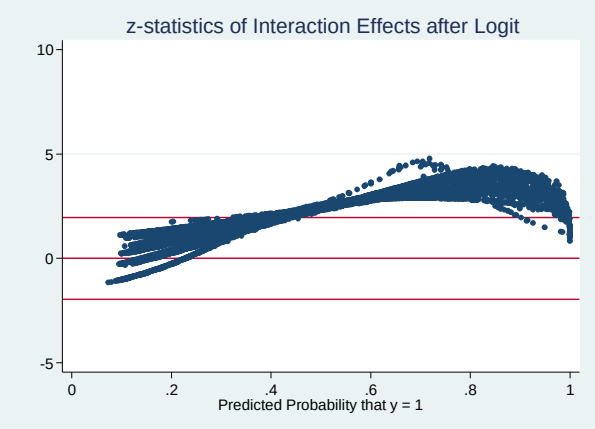


Figure 2: Plotting the Moderating Effect of Hofstede's PDI on the Relationship between Family Ownership and Product and Process Innovation following Norton et al. (2004)

Product innovation: Family ownership (H1.2)

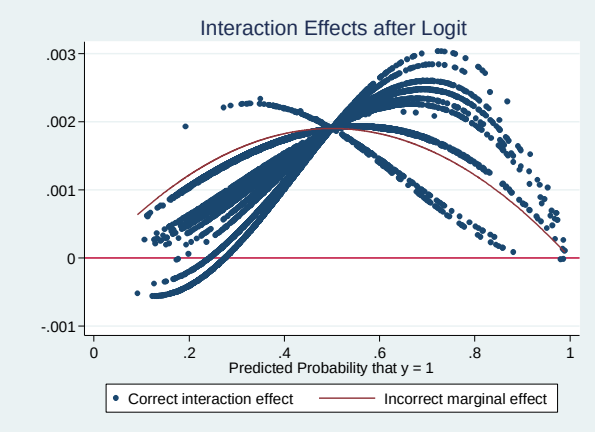


Graph 1

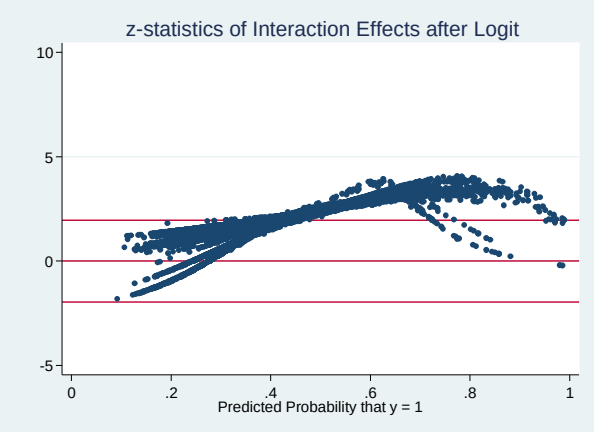


Graph 2

Process innovation: Family ownership (H1.2)



Graph 3



Graph 4

Table 1: Power Distance Index (PDI) by G. Hofstede and the GLOBE power distance (7-points scale)

PDI Range	PDI Category	Country (PDI; GLOBE power distance)
0-25	Low power distance	Austria (11; 5)
26-50	Medium-low power distance	Germany (35; 5.48), Hungary (46; 5.57), Italy (50; 5.45), UK (35; 5.26)
51-75	Medium high power distance	France (68; 5.68), Spain (57; 5.53)
75-100	High power distance	No representation

Table 2: Descriptive Statistics (The sample for all firms owned by a domestic top shareholder of 12,936 observations)

Variable	Obs.	Mean	SD	Min	Max
Product innovation	12,936	0.4812	0.4997	0	1
Process innovation	12,936	0.4317	0.4953	0	1
Sales innovative products	12,936	9.780	18.450	0	100
Family ownership	12,936	0.6426	0.4792	0	1
Holding firm	12,936	0.0353	0.1844	0	1
Industrial firm	12,936	0.0323	0.1768	0	1
Concentration	12,687	65.303	27.950	0	100
Hofstede's PDI	12,936	48.540	13.915	11	68
GLOBE power distance	12,936	5.483	0.148	5	5.68
Business group	12,936	0.1586	0.3653	0	1
Bank debt ratio	12,936	0.3903	0.4694	0	1
R&D share	12,936	3.545	7.494	0	100
Active abroad	12,936	0.7527	0.4315	0	1
Competition	12,936	0.5019	0.5000	0	1
Firm size	12,934	72.356	289.049	10	12,000
Firm age	12,911	35.485	30.332	1	190

Table 3: Correlation Matrix (The sample for all firms owned by a domestic top shareholder of 12,936 observations)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Product innovation	1															
Process innovation	0.2581***	1														
Sales innovative products	0.5504***	0.1848***	1													
Family ownership	0.0080	0.0078	0.0033	1												
Holding firm	0.0282***	0.0145*	0.0068	-0.2563***	1											
Industrial firm	-0.0124	-0.0004	0.0041	-0.2450***	-0.0349***	1										
Concentration	0.0059	-0.0201**	-0.0065	-0.0457***	0.1451***	0.0795***	1									
Hofstede's PDI	-0.0761***	-0.0289***	-0.0527***	-0.1747***	0.0844***	0.0764***	-0.0749***	1								
GLOBE power distance	-0.0879***	-0.0643***	-0.0691***	-0.1315***	0.0647***	0.0745***	0.0338***	0.8538***	1							
Business group	0.0608***	0.0496***	0.0204**	-0.3473***	0.2693***	0.2701***	0.2115***	0.1215***	0.0907***	1						
Bank debt ratio	0.0422***	0.0939***	0.0285***	0.0172**	-0.0179**	-0.0254***	-0.1066***	0.1471***	0.0434***	-0.0204**	1					
R&D share	0.2598***	0.1492***	0.3368***	-0.0242***	0.0086	0.0124	0.0042	-0.0400***	-0.0348***	0.0351***	0.0030	1				
Active abroad	0.2182***	0.1263***	0.1540***	-0.0547***	0.0571***	0.0298***	-0.0094	0.0194**	-0.0088	0.0944***	0.0540***	0.1328***	1			
Competition	0.1635***	0.0876***	0.1193***	-0.0731***	0.0647***	0.0281***	0.0263***	0.1088***	0.0797***	0.1177***	0.0001	0.1180***	0.3199***	1		
Firm size	0.1472***	0.1251***	0.0305***	-0.1720***	0.1554***	0.1083***	0.1000***	-0.0808***	-0.0070	0.3492***	0.0089	0.0434***	0.1799***	0.1340***	1	
Firm age	0.0375***	-0.0006	-0.0535***	0.0838***	0.0217***	-0.0519***	0.0427***	-0.0518***	-0.0018	0.0106	-0.0562	-0.0245***	0.0868***	0.0617***	0.2045***	1
VIF	2.65	2.67	2.65	2.66	2.67	2.67	2.67	2.00	2.00	2.66	2.67	2.67	2.67	2.66	2.66	2.65

Note: Sector (2 digits of the NACE 2 rev.1 classification) and country dummies omitted to preserve space.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Innovative versus Non-innovative European Firms

Variable	Product innovation	Process innovation	Product/Process innovation (b)	No product/process innovation (B)	Δ (b-B)
Family ownership	0.6466	0.6469	0.6472	0.6344	0.0128
Holding firm	0.0406	0.0383	0.0374	0.0315	0.0059*
Industrial firm	0.0300	0.0322	0.0319	0.0330	-0.0011
Concentration	65.475	64.660	64.795	66.212	-1.417**
Hofstede's PDI	47.440	48.080	47.928	49.634	-1.706***
GLOBE power distance	5.469	5.472	5.474	5.499	-0.025***
Business group	0.1817	0.1794	0.1736	0.1319	0.0417***
Bank debt ratio	0.4109	0.4409	0.4238	0.3304	0.0934***
R&D share	5.567	4.828	4.866	1.182	3.684***
Active abroad	0.8504	0.8152	0.8202	0.6322	0.188***
Competition	0.5868	0.5522	0.5565	0.4044	0.1521***
Firm size	93.725	88.545	84.781	50.154	34.627***
Firm age	36.778	35.575	35.983	34.599	1.384**
			European SMEs		
Family ownership	0.6660	0.6681	0.6651	0.6402	0.0249***
Holding firm	0.0340	0.0320	0.0314	0.0287	0.0027
Industrial firm	0.0259	0.0272	0.0274	0.0323	-0.0049
Concentration	64.645	63.797	64.043	65.861	-1.818***
Hofstede's PDI	47.625	48.225	48.080	49.786	-1.706***
GLOBE power distance	5.469	5.472	5.474	5.499	-0.025***
Business group	0.1521	0.1503	0.1466	0.1213	0.0253***
Bank debt ratio	0.4151	0.4441	0.4281	0.3320	0.0961***
R&D share	5.566	4.810	4.845	1.116	3.729***
Active abroad	0.8433	0.8056	0.8123	0.6284	0.1839***
Competition	0.5776	0.5423	0.5473	0.4016	0.1457***
Firm size	43.243	43.175	41.955	32.568	9.387***
Firm age	35.098	34.062	34.486	33.839	0.647

Table 4 continued: Innovative versus Non-innovative European Firms

Variable	Product innovation	Process innovation	Product/Process innovation (b)	No product/process innovation (B)	Δ (b-B)
			Large European Firms		
Family ownership	0.3812	0.3416	0.3755	0.4552	-0.0797*
Holding firm	0.1318	0.1295	0.1284	0.1172	0.0112
Industrial firm	0.0871	0.1047	0.1012	0.0552	0.046*
Concentration	76.917	77.227	76.286	77.021	-0.735
Hofstede's PDI	44.922	45.986	45.630	44.917	0.713
GLOBE power distance	5.469	5.467	5.475	5.499	-0.024*
Business group	0.5859	0.5978	0.5817	0.4621	0.1196**
Bank debt ratio	0.3531	0.3949	0.3586	0.2807	0.0779*
R&D share	5.574	5.077	5.195	3.214	1.981***
Active abroad	0.9482	0.9532	0.9397	0.7517	0.188***
Competition	0.7129	0.6942	0.6965	0.4897	0.2068***
Firm size	784.290	744.828	735.693	595.200	140.493
Firm age	59.719	57.334	58.653	58.124	0.529

Note: The sample for all firms owned by a domestic top shareholder of 12,936 observations; including large firms of 659 observations; and SMEs of 12,277 observations
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimating the Impact of Power Contingencies on Owner Type on Product Innovation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			0.205***	0.051	0.207***	0.052	0.195***	0.049	0.197***	0.049
			(0.0471)	(0.0117)	(0.0478)	(0.0118)	(0.0474)	(0.0118)	(0.0482)	(0.0119)
Holding firm			0.137	0.034	0.242	0.063	0.119	0.030	0.223	0.058
			(0.117)	(0.0292)	(0.162)	(0.0419)	(0.132)	(0.0328)	(0.172)	(0.0440)
Industrial firm			-0.253**	-0.063	-0.254**	-0.063	-0.257**	-0.064	-0.257*	-0.063
			(0.119)	(0.0292)	(0.127)	(0.0318)	(0.131)	(0.0319)	(0.137)	(0.0340)
Moderating variables										
Concentration (CONC)	0.000306	0.00008	0.000171	0.00004	0.000175	0.00003	0.000350	0.00009	0.000307	0.00007
	(0.000752)	(0.0002)	(0.000757)	(0.0002)	(0.00127)	(0.0002)	(0.000761)	(0.0002)	(0.00128)	(0.0002)
Hofstede's PDI	-0.0366***	-0.009	-0.0347***	-0.009	-0.0347***	-0.009	-0.0406***	-0.009	-0.0406***	-0.009
	(0.0115)	(0.0029)	(0.0115)	(0.0029)	(0.0115)	(0.0029)	(0.0117)	(0.0029)	(0.0117)	(0.0029)
Interaction terms										
Family ownership*CONC					0.000188	-			0.000276	-
					(0.00156)				(0.00157)	
Holding firm*CONC					-0.00544	-			-0.00560	-
					(0.00560)				(0.00560)	
Industrial firm*CONC					-0.000180	-			-0.000288	-
					(0.00415)				(0.00417)	
Family ownership*PDI							0.00858**	-	0.00866**	-
							(0.00337)		(0.00338)	
Holding firm*PDI							0.00514	-	0.00580	-
							(0.00808)		(0.00806)	
Industrial firm*PDI							0.00351	-	0.00356	-
							(0.00900)		(0.00902)	

Table 5 continued: Estimating the Impact of Power Contingencies on Owner Type on Product Innovation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.000624	0.00016	0.0943	0.024	0.0989	0.025	0.0926	0.023	0.0984	0.025
	(0.0609)	(0.0152)	(0.0655)	(0.0164)	(0.0665)	(0.0166)	(0.0658)	(0.0164)	(0.0668)	(0.0167)
Bank debt ratio	0.216***	0.054	0.211***	0.053	0.210***	0.053	0.210***	0.052	0.209***	0.052
	(0.0442)	(0.0110)	(0.0443)	(0.0111)	(0.0443)	(0.0111)	(0.0443)	(0.0111)	(0.0443)	(0.0111)
R&D share	0.110***	0.028	0.110***	0.028	0.110***	0.027	0.110***	0.028	0.110***	0.027
	(0.00812)	(0.0020)	(0.00812)	(0.0020)	(0.00812)	(0.0020)	(0.00812)	(0.0020)	(0.00811)	(0.0020)
Active abroad	0.669***	0.167	0.674***	0.168	0.674***	0.169	0.672***	0.168	0.673***	0.168
	(0.0509)	(0.0127)	(0.0510)	(0.0127)	(0.0510)	(0.0127)	(0.0510)	(0.0127)	(0.0510)	(0.0127)
Competition	0.378***	0.094	0.377***	0.094	0.377***	0.094	0.376***	0.094	0.376***	0.094
	(0.0433)	(0.0108)	(0.0433)	(0.0108)	(0.0433)	(0.0108)	(0.0433)	(0.0108)	(0.0433)	(0.0108)
Firm size	0.219***	0.055	0.230***	0.058	0.231***	0.058	0.229***	0.057	0.229***	0.057
	(0.0244)	(0.0061)	(0.0246)	(0.0062)	(0.0247)	(0.0062)	(0.0246)	(0.0062)	(0.0247)	(0.0062)
Firm age	0.0177	0.004	0.000860	0.0002	0.00138	0.0003	0.00103	0.0003	0.00163	0.0004
	(0.0269)	(0.0067)	(0.0271)	(0.0068)	(0.0271)	(0.0068)	(0.0271)	(0.0068)	(0.0271)	(0.0068)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	0.385**		0.285*		0.283*		0.291*		0.289*	
	(0.152)		(0.155)		(0.155)		(0.155)		(0.155)	
Observations	12,392		12,392		12,392		12,392		12,392	
Pseudo/R-squared	0.1358		0.1374		0.1375		0.1378		0.1379	
Log pseudo-likelihood	-7413.5568		-7399.4519		-7398.8268		-7396.2519		-7395.5699	
Percent correctly predicted	68.99%		69.03%		69.10%		69.12%		69.15%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			0.135***	0.033	0.137***	0.033	0.129***	0.032	0.132***	0.032
			(0.0454)	(0.0110)	(0.0463)	(0.0112)	(0.0455)	(0.0111)	(0.0464)	(0.0112)
Holding firm			-0.0202	-0.005	-0.0117	-0.003	0.0477	0.011	0.0460	0.010
			(0.110)	(0.0269)	(0.141)	(0.0358)	(0.123)	(0.0301)	(0.149)	(0.0380)
Industrial firm			-0.138	-0.033	-0.174	-0.044	-0.157	-0.038	-0.187	-0.047
			(0.117)	(0.0279)	(0.121)	(0.0292)	(0.128)	(0.0304)	(0.131)	(0.0312)
Moderating variables										
Concentration (CONC)	-0.000558	-0.0001	-0.000598	0.0001	-0.00104	-0.0001	-0.000442	-0.0001	-0.000978	0.0001
	(0.000723)	(0.0002)	(0.000728)	(0.0002)	(0.00124)	(0.0002)	(0.000730)	(0.0002)	(0.00125)	(0.0002)
Hofstede's PDI	-0.0554***	-0.014	-0.0543***	-0.013	-0.0541***	-0.013	-0.0584***	-0.013	-0.0582***	-0.013
	(0.0119)	(0.0029)	(0.0119)	(0.0029)	(0.0119)	(0.0029)	(0.0121)	(0.0029)	(0.0121)	(0.0029)
Interaction terms										
Family ownership*CONC					0.000506	-			0.000644	-
					(0.00152)				(0.00152)	
Holding firm*CONC					0.000116	-			0.000754	-
					(0.00474)				(0.00490)	
Industrial firm*CONC					0.00411	-			0.00396	-
					(0.00400)				(0.00400)	
Family ownership*PDI							0.00689**	-	0.00686**	-
							(0.00322)		(0.00322)	
Holding firm*PDI							-0.00896	-	-0.00907	-
							(0.00755)		(0.00760)	
Industrial firm*PDI							0.00605	-	0.00538	-
							(0.00923)		(0.00927)	

Table 6 continued: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.0154	0.004	0.0842	0.021	0.0834	0.020	0.0754	0.018	0.0753	0.018
	(0.0583)	(0.0143)	(0.0623)	(0.0153)	(0.0634)	(0.0155)	(0.0625)	(0.0153)	(0.0637)	(0.0156)
Bank debt ratio	0.283***	0.069	0.280***	0.069	0.280***	0.069	0.279***	0.068	0.280***	0.069
	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.0426)	(0.0105)	(0.0426)	(0.0105)
R&D share	0.0447***	0.011	0.0446***	0.011	0.0446***	0.011	0.0446***	0.011	0.0446***	0.011
	(0.00434)	(0.0011)	(0.00432)	(0.0011)	(0.00432)	(0.0011)	(0.00432)	(0.0011)	(0.00433)	(0.0011)
Active abroad	0.404***	0.099	0.408***	0.100	0.408***	0.100	0.405***	0.099	0.406***	0.099
	(0.0490)	(0.0120)	(0.0490)	(0.0120)	(0.0490)	(0.0120)	(0.0490)	(0.0120)	(0.0490)	(0.0120)
Competition	0.241***	0.059	0.240***	0.059	0.240***	0.059	0.238***	0.058	0.238***	0.058
	(0.0417)	(0.0102)	(0.0418)	(0.0102)	(0.0418)	(0.0102)	(0.0418)	(0.0102)	(0.0418)	(0.0102)
Firm size	0.245***	0.060	0.253***	0.062	0.253***	0.062	0.252***	0.062	0.252***	0.062
	(0.0235)	(0.0058)	(0.0238)	(0.0058)	(0.0238)	(0.0058)	(0.0238)	(0.0058)	(0.0238)	(0.0058)
Firm age	-0.0590**	-0.014	-0.0697***	-0.017	-0.0702***	-0.017	0.252***	-0.017	-0.0701***	-0.017
	(0.0262)	(0.0064)	(0.0264)	(0.0065)	(0.0264)	(0.0065)	(0.0238)	(0.0065)	(0.0264)	(0.0065)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	-0.690***		-0.756***		-0.756***		-0.753***		-0.754***	
	(0.156)		(0.159)		(0.159)		(0.158)		(0.158)	
Observations	12,392		12,392		12,392		12,392		12,392	
Pseudo/R-squared	0.0567		0.0575		0.0576		0.0580		0.0580	
Log pseudo-likelihood	-7995.0623		-7988.7664		-7988.2325		-7984.7105		-7984.2014	
Percent correctly predicted	63.15%		63.29%		63.34%		63.40%		63.36%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Estimating the Impact of Power Contingencies on Owner Type and Innovative Products Sales

	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Family ownership		0.860**	0.924***	0.802**	0.866**
		(0.354)	(0.354)	(0.359)	(0.358)
Holding firm		0.583	1.757	0.165	1.372
		(0.958)	(1.551)	(1.180)	(1.718)
Industrial firm		-0.221	-0.430	-0.249	-0.428
		(1.052)	(1.092)	(1.148)	(1.168)
Moderating variables					
Concentration (CONC)	0.00307	0.00229	-0.00433	0.00302	-0.00367
	(0.00591)	(0.00595)	(0.00940)	(0.00593)	(0.00935)
Hofstede's PDI	-0.0800*	-0.0865	-0.0833	-0.118	-0.116
	(0.0430)	(0.0975)	(0.0975)	(0.0996)	(0.0995)
Interaction terms					
Family ownership*CONC			0.0114		0.0118
			(0.0117)		(0.0118)
Holding firm*CONC			-0.0546		-0.0593
			(0.0512)		(0.0497)
Industrial firm*CONC			0.0251		0.0247
			(0.0363)		(0.0366)
Family ownership*PDI				0.0427*	0.0436*
				(0.0250)	(0.0251)
Holding firm*PDI				0.0770	0.0861
				(0.0766)	(0.0744)
Industrial firm*PDI				0.0179	0.0134
				(0.0738)	(0.0746)
Control variables					
Business group	0.162	0.450	0.533	0.465	0.558
	(0.482)	(0.499)	(0.506)	(0.503)	(0.509)
Bank debt ratio	0.815**	0.802**	0.797**	0.796**	0.789**
	(0.352)	(0.352)	(0.352)	(0.352)	(0.352)
R&D share	0.753***	0.753***	0.752***	0.753***	0.752***
	(0.0481)	(0.0481)	(0.0482)	(0.0479)	(0.0480)
Active abroad	3.646***	3.654***	3.664***	3.646***	3.655***
	(0.331)	(0.331)	(0.332)	(0.331)	(0.332)
Competition	2.035***	2.027***	2.023***	2.027***	2.022***
	(0.340)	(0.340)	(0.340)	(0.340)	(0.339)
Firm size	0.0827	0.120	0.128	0.111	0.120
	(0.181)	(0.184)	(0.184)	(0.184)	(0.184)
Firm age	-1.256***	-1.315***	-1.309***	-1.316***	-1.309***
	(0.210)	(0.211)	(0.212)	(0.211)	(0.211)
Sector Dummies	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes
Constant	8.961***	8.457***	8.435***	8.491***	8.468***
	(1.072)	(1.232)	(1.232)	(1.233)	(1.233)
Observations	12,392	12,392	12,392	12,392	12,392
Pseudo/R-squared	0.157	0.157	0.158	0.158	0.158

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Estimating the Mean Interaction Effect, Standard Error and z-Statistics of the Interaction between Hofstede's PDI and Owner Identities and Innovation

Mean	Interaction effect	Standard error	z-Statistic
Product Innovation			
Family Ownership	0.00149	0.0007	2.1652[a]
Holding Firm	0.00004	0.0016	0.0504
Industrial Firm	1.47e-06	0.0018	-0.0607
Process Innovation			
Family Ownership	0.00147	0.0007	1.9834[a]
Holding Firm	-0.0029	0.0017	-1.6353
Industrial Firm	0.0011	0.0021	0.4963

[a] Significant z-Statistics: A sample mean with a z-score greater than or equal to the critical value of 1.645 is significant at the 0.05 level.

7. References

Aguilera, R. V, & Jackson, G. (2003). The Cross-National Diversity of Corporate Governance : Dimensions and Determinants*. Academy of Management Review, 28*(3), 447–465.

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions.* Sage.

Almeida, H., Park, S. Y., Subrahmanyam, M. G., & Wolfenzon, D. (2011). The structure and formation of business groups: Evidence from Korean chaebols. *Journal of Financial Economics, 99*(2), 447–475.

Altomonte, C., & Aquilante, T. (2012). The EU-EFIGE/Bruegel-Unicredit Dataset. *Bruegel Working Paper*, 13, 1–46.

Banerjee, S., Leleux, B., & Vermaelen, T. (1997). Large Shareholdings and Corporate Control: An Analysis of Stake Purchases by French Holding Companies. *European Financial Management, 3*(1), 23–43.

Barney, J. B. (2001). Is the Resource-Based "View" a Useful Perspective for Strategic Management Research ? *Academy of Management Review, 26*(1), 41–56.

Belloc, F. (2012). Corporate governance and innovation: A survey. *Journal of Economic Surveys, 26*(5), 835–864.

Bingham, C. B., Eisenhardt, K. M., & Furr, N. R. (2007). What makes a process a capability? Heuristics, Strategy and Effective Capture of Opportunities. *Strategic Entrepreneurship Journal, 1*(1), 27–47.

Block, J., & Jaskiewicz, P. (2007). The Impact of Non-Family Executives on Firm Value: Conclusions from the Jensen-Meckling Theory of the Firm. *Available at SSRN: https://ssrn.com/abstract=947047.*

Bong, S., Hee, S., & Williams, C. (2011). Ownership and firm innovation in a transition economy : Evidence from China. *Research Policy, 40*(3), 441–452.

Bushee, B.M. (1998). The influence of institutional investors on myopic R&D investment behavior. *Accounting Review, 73*, 305-333

Carney, M. (2005). Corporate Governance and Competitive Advantage in Family-Controlled Firms. *Entrepreneurship Theory and Practice*, 249–265.

Cassiman, B., & Veugelers, R. (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science, 52*(1), 68–82.

Choi, S. B., Park, B. Il, & Hong, P. (2012). Does Ownership Structure Matter for Firm Technological Innovation Performance? The Case of Korean Firms. Corporate Governance: *An International Review, 20*(3), 267–288.

Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). The ability and willingness paradox in family firm innovation. *Journal of Product Innovation Management, 32*(3), 310–318.

Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D Investments of Family and Nonfamily Firms: Behavioral Agency and Myopic Loss Aversion Perspectives. *Academy of Management Journal, 55*(4), 976–997.

Christensen, C. M., & Overdorf, M. (2000). Meeting the Challenge of Disruptive Change Meeting the Challenge of Disruptive Change. *Harvard Business Review, March-April, 1–10.*

Claessens, S., & Djankov, S. (1999). Ownership concentration and corporate performance in the Czech Republic. *Journal of Comparative Economics, 27*(3), 498-513.

Cruz-Cázares, C., Bayona-Sáez, C., & García-Marco, T. (2010). R&D Strategies and Firm Innovative Performance: A Panel Data Analysis. *International Journal of Innovation Management, 14*(6), 1013–1045.

De Massis, A., Frattini, F., & Lichtenthaler, U. (2012). Research on Technological Innovation in Family Firms: Present Debates and Future Directions. *Family Business Review, 26*(1), 10–31.

De Massis, A., Kotlar, J., Frattini, F., Chrisman, J. J., & Nordqvist, M. (2016). Family governance at work : Organizing for new product development in family SMEs. *Family Business Review, 29*(2), 189–213.

Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Academy of Management Journal, 59*(4), 1224–1264.

Fama, E. F., & Jensen, M. C. (1985). Organizational Forms and Investment Decisions. *Business, 14*, 101–119.

Francis, J., & Smith, A. (1995). Agency costs and innovation: Some empirical evidence. *Journal of Accounting and Economics, 19*, 383–409.

Gomez-Mejia, L. R., Takács Haynes, K., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional Wealth and Business Risks in Family-controlled Firms: Evidence from Spanish Olive Oil Mills. *Administrative Science Quarterly, 52*(1), 106–137.

Gómez, J., & Vargas, P. (2012). Intangible resources and technology adoption in manufacturing firms. Research Policy, 41(9), 1607–1619.

Habbershon, T. G., & Williams, M. L. (1999). Introduction A Resource-Based Framework for Assessing the Strategic Advantages of Family Firms. *Family Business Review, 12*(1), 1–26.

Hagedoorn, J., & Cloodt, M. (2003). Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy, 32*(8), 1365–1379.

Hatak, I., Kautonen, T., Fink, M., & Kansikas, J. (2016). Innovativeness and family-firm performance: The moderating effect of family commitment. *Technological Forecasting and Social Change, 102*, 120–131.

Hitt, M. A., Hoskisson, R. E., Johnson, R. A., & Moesel, D. D. (1996). The Market for Corporate Control and Firm Innovation. *The Academy of Management Journal*, 39(5), 1084–1119.

Hofstede, G., 1980. *Culture's Consequences: International Differences in Work-related Values.* Sage, Newbury Park, CA.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). Cultures and Organizations, Software of the Mind: Intercultural Cooperation and its Importance for Survival. *McGraw Hill, 3rd Edition, 1*, 279.

Honoré, F., Munari, F., & van Pottelsberghe de La Potterie, B. (2015). Corporate governance practices and companies' R&D intensity: Evidence from European countries*. Research Policy, 44*(2), 533–543.

Hoskisson, R. E., Hitt, M. a, Johnson, R. a, & Grossman, W. (2002). Conflicting Voices: The Effects of Institutional Ownership Heterogeneity and Internal Governance on Corporate Innovation Strategies. *Management, 45*(4), 697–716.

House, R. J. (2004) Preface. In R. J. House, P. J. Hanges, M. Javidan, P. W. Dorfman & V. Gupta (Eds.), *Culture, leadership, and organizations: The GLOBE study of 62 societies (pp. xxii-xxviii).* Thousand Oaks, CA: Sage.

Joseph, J., Ocasio, W., & McDonnell, M.-H. (2014). the Structural Elaboration of Board Independence: Executive Power, Institutional Logics, and the Adoption of CEO-Only Board Structures in U.S. Corporate Governance. *Academy of Management Journal, 57*(6), 1834–1858.

Kammerlander, N., van Essen, M. (2017). 'Research: Family Firms Are More Innovative Than Other Companies'. Boston, MA: *Harvard Business School Publishing.*

Karra, N., Tracey, P., & Phillips, N. (2006). Altruism and Agency in the Family Firm. Entrepreneurship: *Theory and Practice*, 861–878.

Kor, Y. Y., & Mahoney, J. T. (2004). Edith Penrose's (1959) Contributions to the Resource-based View of Strategic Management. *Journal of Management Studies, 41*(1), 183–191.

Kotlar, J., De Massis, A., Frattini, F., Bianchi, M., & Fang, H. (2013). Technology acquisition in family and nonfamily firms: A longitudinal analysis of Spanish manufacturing firms. *Journal of Product Innovation Management, 30*(6), 1073–1088.

Krause, R., Filatotchev, I., & Bruton, G. D. (2016). When in Rome, look like Caesar? Investigating the link between demand-side cultural power distance and CEO power. *Academy of Management Journal, 59*(4), 1361–1384.

La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (1999), "Corporate ownership around the world" *Journal of Finance, 54*(2), 471–517.

Mcguire, D., Cunningham, J., Seaman, C., & Mcguire, D. (2016). Perceptions of Knowledge Sharing Among Small Family Firm Leaders: A Structural Equation Model. *Family Business Review*, 1-22.

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2015). The impact of family ownership, management, and governance on innovation. *Journal of Product Innovation Management, 32*(3), 319–333.

Minetti, R., Murro, P., & Paiella, M. (2015). Ownership structure, governance, and innovation. *European Economic Review, 80*, 165–193.

Miozzo, M., & Dewick, P. (2002). Building competitive advantage: innovation and corporate governance in European construction. *Research Policy, 31*, 989–1008.

Munari, F., Oriani, R., & Sobrero, M. (2010). The effects of owner identity and external governance systems on R&D investments: A study of western European firms. *Research Policy, 39*(8), 1093–1104.

Norton, E. C., Wang, H., & Ai, C. (2004). Computing interaction effects and standard errors in logit and probit models. *Stata Journal, 4*(2), 154–167.

OECD (Organization for Economic Cooperation and Development)/Eurostat 2005. *Guidelines for Collecting and Interpreting Innovation Data* — The Oslo Manual, 3rd Edition. Paris: OECD.

Oslond, J. S., & Bird, A. (2000). Beyond sophisticated stereotyping : Cultural sense-making in context. *Academy of Management Executive, 14*(1), 65–77.

Park, J. Y. (2014). The evolution of waste into a resource: Examining innovation in technologies reusing coal combustion by-products using patent data. *Research Policy, 43*(10), 1816–1826.

Pfeffer, J., & Salancik, G. R. 1978. The external control of organizations: A resource dependence perspective. *New York, NY: Harper & Row*.

Porter, M. E. 1979. How competitive forces shape strategy. *Harvard Business Review, 57*: 137–145.

Prowse, S. D. (1992). The structure of corporate ownership in Japan. *Journal of Finance, 47*(3), 1121-1140.

Rosenbusch, N., Brinckmann, J., & Bausch, A. (2013). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing, 7*(14), 4682–4688.

Schumpeter, J. (1942). Creative destruction. *Capitalism, socialism and democracy*, 825.

Shi, X., & Wang, J. (2011). Interpreting Hofstede Model and GLOBE Model: Which Way to Go for Cross-Cultural Research? *International Journal of Business and Management, 6*(5), 93–99.

Sirmon, D. G., & Hitt, M. A. (2003). Managing resources: Linking unique resources, management, and wealth creation in family firms. *Entrepreneurship Theory and Practice, 27*(4), 339-358.

Shleifer, A., & Vishny, R. W. (1997). A Survey of Corporate Governance. *Journal of Finance, LII*(2), 737–783.

Taylor, M.Z., & Wilon, S. (2012). Does culture still matter? The effects of individualism on national innovation rates. *Journal of Business Venturing, 27*(2), 234-247.

Thomsen, S., & Pedersen, T. (2000). Ownership Structure and Economic Performance in the Largest European Companies. *Strategic Management Journal, 21,* 689–705.

Tribo, P. Berrone, P., Surroca, J. (2007), "Do the Type and Number of Blockholders Influence R&D Investments? New evidence from Spain", *Corporate Governance, 15*(5), 828-848.

Tylecote, A., & Ramirez, P. (2006). Corporate governance and innovation: The UK compared with the US and "insider" economies. *Research Policy, 35*(1), 160–180.

Van Der Vegt, G. S., Van De Vliert, E., & Huang, X. (2005). Location-Level Links Between Diversity and Innovative Climate Depend on National Power Distance. *Academy of Management Journal, 48*(6), 1171–1182.

Van Hulle, C. (1998). On the nature of European holding groups. *International Review of Law and Economics, 18*(3), 255–277.

Varsakelis, N. C. (2001). The impact of patent protection, economy openness and national culture on R&D investment: A cross-country empirical investigation. *Research Policy, 30*(7), 1059–1068.

Vecchi, A., & Brennan, L. (2009). A cultural perspective on innovation in international manufacturing. *Research in International Business and Finance, 23*(2), 181-192.

Venaik, S., & Brewer, P. (2008). Contradictions in national culture: Hofstede vs GLOBE. *50th Annual Meeting of the Academy of International Business* (AIB), 274–274.

Wischnevsky, J. D., Damanpour, F., & Mendez, F. A. (2011). Influence of Environmental Factors and Prior Changes on the Organizational Adoption of Changes in Products and in Technological and Administrative Processes. *British Journal of Management, 22*(1), 132–149.

Zahra, S.A., 1996. Governance, ownership, and corporate entrepreneurship, the moderating impact of industry technological opportunities. *Academy of Management Journal, 39*, 1713–1735.

8. Appendix

Table 9: Testing Robustness of the Impact of Power Contingencies on Owner Type and Innovation

	Product Innovation				Process Innovation				Innovative products sales	
	Model 1		Model 2		Model 3		Model 4		Model 5	Model 6
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Coefficients
Independent variables										
Family ownership	0.198***	0.050	0.198***	0.051	0.132***	0.033	0.133***	0.033	0.813**	0.867**
	(0.0473)	(0.0117)	(0.0481)	(0.0118)	(0.0455)	(0.0111)	(0.0464)	(0.0112)	(0.359)	(0.359)
Holding firm	0.159	0.040	0.256	0.066	0.0229	0.005	0.0204	0.004	0.371	1.559
	(0.129)	(0.0318)	(0.168)	(0.0430)	(0.119)	(0.0290)	(0.146)	(0.0371)	(1.146)	(1.677)
Industrial firm	-0.268**	-0.066	-0.267*	-0.065	-0.197	-0.046	-0.223*	-0.054	-0.123	-0.296
	(0.133)	(0.0320)	(0.138)	(0.0340)	(0.129)	(0.0302)	(0.132)	(0.0309)	(1.273)	(1.274)
Moderating variables										
Concentration (CONC)	0.000347	0.00009	0.000555	0.00007	-0.000484	-0.0001	-0.000808	-0.0001	0.00340	-0.00192
	(0.000761)	(0.0002)	(0.00129)	(0.0002)	(0.000730)	(0.0002)	(0.00125)	(0.0002)	(0.00592)	(0.00929)
GLOBE power distance	-1.723***	-0.303	-1.733***	-0.303	-2.245***	-0.466	-2.231***	-0.465	-6.454*	-6.293
	(0.456)	(0.1019)	(0.457)	(0.1020)	(0.466)	(0.1036)	(0.466)	(0.1036)	(3.883)	(3.878)
Interaction terms										
Family ownership*CONC			-0.000118	-			0.000326	-		0.00948
			(0.00157)				(0.00152)			(0.0117)
Holding firm*CONC			-0.00546	-			0.000598	-		-0.0592
			(0.00566)				(0.00490)			(0.0492)
Industrial firm*CONC			-0.000621	-			0.00349	-		0.0242
			(0.00416)				(0.00399)			(0.0371)
Family ownership*GLOBE	0.771**	-	0.779**	-	0.503*	-	0.492*	-	5.164**	5.039**
	(0.311)		(0.312)		(0.295)		(0.295)		(2.473)	(2.462)
Holding firm*GLOBE	-0.148	-	-0.0741	-	-0.631	-	-0.646	-	4.915	5.759
	(0.748)		(0.746)		(0.680)		(0.688)		(7.353)	(7.098)
Industrial firm*GLOBE	0.530	-	0.550	-	1.195	-	1.104	-	0.329	-0.351
	(0.905)		(0.905)		(0.939)		(0.946)		(8.992)	(9.185)

Table 9 continued: Testing Robustness of the Impact of Power Contingencies on Owner Type and Innovation

	Product Innovation				Process Innovation				Innovative products sales	
	Model 1		Model 2		Model 3		Model 4		Model 5	Model 6
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Coefficients
Control variables										
Business group	0.0909	0.023	0.0941	0.024	0.0789	0.019	0.0771	0.019	0.448	0.526
	(0.0658)	(0.0164)	(0.0668)	(0.0167)	(0.0625)	(0.0153)	(0.0636)	(0.0156)	(0.503)	(0.509)
Bank debt ratio	0.209***	0.052	0.209***	0.052	0.279***	0.068	0.280***	0.069	0.785**	0.780**
	(0.0443)	(0.0111)	(0.0443)	(0.0111)	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.352)	(0.352)
R&D share	0.110***	0.028	0.110***	0.028	0.0447***	0.011	0.0447***	0.011	0.753***	0.752***
	(0.00811)	(0.0020)	(0.00811)	(0.0020)	(0.00432)	(0.0011)	(0.00433)	(0.0011)	(0.0480)	(0.0481)
Active abroad	0.673***	0.168	0.673***	0.168	0.407***	0.100	0.407***	0.100	3.649***	3.658***
	(0.0510)	(0.0127)	(0.0510)	(0.0127)	(0.0490)	(0.0120)	(0.0490)	(0.0120)	(0.331)	(0.332)
Competition	0.376***	0.094	0.376***	0.094	0.239***	0.059	0.239***	0.058	2.023***	2.020***
	(0.0433)	(0.0108)	(0.0433)	(0.0108)	(0.0418)	(0.0102)	(0.0418)	(0.0102)	(0.340)	(0.340)
Firm size	0.229***	0.057	0.229***	0.057	0.252***	0.062	0.252***	0.062	0.111	0.118
	(0.0246)	(0.0062)	(0.0247)	(0.0062)	(0.0238)	(0.0058)	(0.0238)	(0.0058)	(0.184)	(0.184)
Firm age	0.000224	0.00006	0.000637	0.0002	-0.0703***	-0.017	-0.0708***	-0.017	-1.321***	-1.316***
	(0.0271)	(0.0068)	(0.0271)	(0.0068)	(0.0264)	(0.0065)	(0.0264)	(0.0065)	(0.211)	(0.212)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	Yes
Country Dummies	Yes		Yes		Yes		Yes		Yes	Yes
Constant	0.489***		0.489***		-0.444***		-0.445***		9.012***	8.979***
	(0.106)		(0.107)		(0.105)		(0.105)		(0.811)	(0.810)
Observations	12,392		12,392		12,392		12,392		12,392	12,392
Pseudo/R-squared	0.1378		0.1379		0.0578		0.0579		0.158	0.158
Log pseudo-likelihood	-7396.0723		-7395.4955		-7985.7275		-7985.3488		-	-
Percent correctly predicted	69.14%		69.17%		63.33%		63.37%		-	-

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 10: Estimating the Impact of Power Contingencies on Owner Type and Product Innovation in European SMEs

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			0.176***	0.044	0.176***	0.044	0.164***	0.042	0.163***	0.042
			(0.0479)	(0.0119)	(0.0488)	(0.0120)	(0.0483)	(0.0120)	(0.0491)	(0.0120)
Holding firm			0.209*	0.052	0.303*	0.079	0.217	0.054	0.306*	0.080
			(0.125)	(0.0311)	(0.169)	(0.0440)	(0.147)	(0.0361)	(0.183)	(0.0469)
Industrial firm			-0.257**	-0.063	-0.254*	-0.062	-0.275*	-0.067	-0.271*	-0.066
			(0.129)	(0.0313)	(0.135)	(0.0337)	(0.141)	(0.0339)	(0.146)	(0.0360)
Moderating variables										
Concentration (CONC)	0.000137	0.00003	-5.60e-05	-0.00001	0.000183	-0.00003	0.000142	0.00004	0.000365	0.00002
	(0.000770)	(0.0002)	(0.000776)	(0.0002)	(0.00131)	(0.0002)	(0.000780)	(0.0002)	(0.00132)	(0.0002)
Hofstede's PDI	-0.0341***	-0.009	-0.0327***	-0.008	-0.0328***	-0.008	-0.0385***	-0.008	-0.0386***	-0.008
	(0.0117)	(0.0029)	(0.0117)	(0.0029)	(0.0117)	(0.0029)	(0.0119)	(0.0029)	(0.0119)	(0.0029)
Interaction terms										
Family ownership*CONC					-0.000178	-			-0.000140	-
					(0.00161)				(0.00161)	
Holding firm*CONC					-0.00528	-			-0.00532	-
					(0.00587)				(0.00591)	
Industrial firm*CONC					-0.000772	-			-0.00104	-
					(0.00440)				(0.00440)	
Family ownership*PDI							0.00859**	-	0.00867**	-
							(0.00346)		(0.00346)	
Holding firm*PDI							0.00137	-	0.00217	-
							(0.00899)		(0.00898)	
Industrial firm*PDI							0.00574	-	0.00591	-
							(0.00969)		(0.00969)	

Table 10 continued: Estimating the Impact of Power Contingencies on Owner Type and Product Innovation in European SMEs

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.123**	0.031	0.204***	0.051	0.206***	0.051	0.200***	0.050	0.203***	0.051
	(0.0610)	(0.0152)	(0.0665)	(0.0166)	(0.0678)	(0.0169)	(0.0669)	(0.0167)	(0.0682)	(0.0170)
Bank debt ratio	0.242***	0.060	0.238***	0.059	0.238***	0.060	0.237***	0.059	0.237***	0.059
	(0.0450)	(0.0112)	(0.0451)	(0.0113)	(0.0451)	(0.0113)	(0.0451)	(0.0113)	(0.0451)	(0.0113)
R&D share	0.116***	0.029	0.116***	0.029	0.116***	0.029	0.116***	0.029	0.116***	0.029
	(0.00874)	(0.0022)	(0.00874)	(0.0022)	(0.00874)	(0.0022)	(0.00873)	(0.0022)	(0.00873)	(0.0022)
Active abroad	0.704***	0.176	0.710***	0.177	0.710***	0.177	0.707***	0.176	0.707***	0.177
	(0.0513)	(0.0128)	(0.0514)	(0.0128)	(0.0514)	(0.0128)	(0.0514)	(0.0128)	(0.0514)	(0.0128)
Competition	0.388***	0.097	0.388***	0.097	0.387***	0.097	0.386***	0.096	0.386***	0.096
	(0.0440)	(0.0110)	(0.0440)	(0.0110)	(0.0440)	(0.0110)	(0.0440)	(0.0110)	(0.0440)	(0.0110)
Firm size	-	-	-	-	-	-	-	-	-	-
Firm age	0.0497*	0.012	0.0357	0.009	0.0362	0.009	0.0356	0.009	0.0362	0.009
	(0.0274)	(0.0069)	(0.0276)	(0.0069)	(0.0276)	(0.0069)	(0.0276)	(0.0069)	(0.0277)	(0.0069)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	0.431***		0.340**		0.339**		0.347**		0.347**	
	(0.156)		(0.160)		(0.160)		(0.160)		(0.160)	
Observations	11,767		11,767		11,767		11,767		11,767	
Pseudo/R-squared	0.1303		0.1317		0.1317		0.1321		0.1321	
Log pseudo-likelihood	-7075.053		-7063.8436		-7063.3585		-7060.7176		-7060.2212	
Percent correctly predicted	68.73%		68.89%		68.85%		68.93%		68.91%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 11: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation in European SMEs

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			0.119***	0.029	0.118**	0.029	0.110**	0.028	0.109**	0.027
			(0.0463)	(0.0112)	(0.0474)	(0.0113)	(0.0465)	(0.0113)	(0.0475)	(0.0114)
Holding firm			0.0926	0.023	0.0713	0.017	0.179	0.043	0.144	0.033
			(0.119)	(0.0295)	(0.152)	(0.0393)	(0.136)	(0.0335)	(0.164)	(0.0423)
Industrial firm			-0.182	-0.044	-0.193	-0.047	-0.205	-0.049	-0.214	-0.051
			(0.127)	(0.0300)	(0.129)	(0.0308)	(0.140)	(0.0327)	(0.141)	(0.0332)
Moderating variables										
Concentration (CONC)	-0.000952	-0.0002	-0.00107	-0.0003	-0.000978	-0.0003	-0.000870	-0.0002	-0.000853	-0.0002
	(0.000742)	(0.0002)	(0.000747)	(0.0002)	(0.00129)	(0.0002)	(0.000750)	(0.0002)	(0.00129)	(0.0002)
Hofstede's PDI	-0.0582***	-0.014	-0.0572***	-0.014	-0.0572***	-0.014	-0.0622***	-0.014	-0.0621***	-0.0139
	(0.0124)	(0.0030)	(0.0124)	(0.0030)	(0.0124)	(0.0030)	(0.0126)	(0.0030)	(0.0126)	(0.0030)
Interaction terms										
Family ownership*CONC					-0.000245	-			-0.000146	-
					(0.00156)				(0.00157)	
Holding firm*CONC					0.00114	-			0.00203	-
					(0.00510)				(0.00534)	
Industrial firm*CONC					0.00141	-			0.00120	-
					(0.00423)				(0.00422)	
Family ownership*PDI							0.00804**	-	0.00799**	-
							(0.00333)		(0.00333)	
Holding firm*PDI							-0.0102	-	-0.0105	-
							(0.00822)		(0.00828)	
Industrial firm*PDI							0.00701	-	0.00691	-
							(0.0102)		(0.0102)	

Table 11 continued: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation in European SMEs

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.175***	0.043	0.235***	0.057	0.231***	0.056	0.225***	0.055	0.221***	0.054
	(0.0586)	(0.0143)	(0.0635)	(0.0155)	(0.0648)	(0.0158)	(0.0638)	(0.0156)	(0.0651)	(0.0159)
Bank debt ratio	0.306***	0.075	0.303***	0.074	0.304***	0.074	0.303***	0.074	0.303***	0.074
	(0.0433)	(0.0106)	(0.0434)	(0.0106)	(0.0434)	(0.0106)	(0.0434)	(0.0106)	(0.0434)	(0.0106)
R&D share	0.0467***	0.011	0.0466***	0.011	0.0466***	0.011	0.0466***	0.011	0.0466***	0.011
	(0.00466)	(0.0011)	(0.00464)	(0.0011)	(0.00464)	(0.0011)	(0.00464)	(0.0011)	(0.00465)	(0.0011)
Active abroad	0.434***	0.106	0.438***	0.107	0.438***	0.107	0.434***	0.106	0.434***	0.106
	(0.0490)	(0.0119)	(0.0491)	(0.0120)	(0.0491)	(0.0120)	(0.0491)	(0.0120)	(0.0491)	(0.0120)
Competition	0.264***	0.064	0.263***	0.064	0.263***	0.064	0.260***	0.064	0.261***	0.064
	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.0426)	(0.0104)	(0.0426)	(0.0104)
Firm size	-	-	-	-	-	-	-	-	-	-
Firm age	-0.0192	-0.005	-0.0287	-0.007	-0.0292	-0.007	-0.0292	-0.007	-0.0297	-0.007
	(0.0267)	(0.0065)	(0.0269)	(0.0066)	(0.0269)	(0.0066)	(0.0269)	(0.0066)	(0.0269)	(0.0066)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	-0.754***		-0.815***		-0.814***		-0.811***		-0.810***	
	(0.164)		(0.166)		(0.167)		(0.166)		(0.166)	
Observations	11,767		11,767		11,767		11,767		11,767	
Pseudo/R-squared	0.0494		0.0501		0.0501		0.0507		0.0507	
Log pseudo-likelihood	-7632.5555		-7627.0406		-7626.9266		-7622.2523		-7622.1177	
Percent correctly predicted	62.77%		62.73%		62.76%		62.80%		62.80%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 12: Estimating the Impact of Power Contingencies on Owner Type and Innovative Products Sales in European SMEs

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Independent variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Family ownership		0.848**	0.918**	0.771**	0.840**
		(0.362)	(0.361)	(0.370)	(0.369)
Holding firm		0.952	2.342	0.559	1.937
		(1.072)	(1.723)	(1.426)	(1.985)
Industrial firm		0.300	0.0916	0.335	0.156
		(1.150)	(1.169)	(1.264)	(1.264)
Moderating variables					
Concentration (CONC)	0.00214	0.000952	-0.00601	0.00199	-0.00493
	(0.00610)	(0.00613)	(0.00976)	(0.00611)	(0.00969)
Hofstede's PDI	-0.0861*	-0.0758	-0.0716	-0.111	-0.108
	(0.0460)	(0.100)	(0.100)	(0.102)	(0.102)
Interaction terms					
Family ownership*CONC			0.0119		0.0120
			(0.0121)		(0.0121)
Holding firm*CONC			-0.0681		-0.0734
			(0.0575)		(0.0550)
Industrial firm*CONC			0.0305		0.0295
			(0.0386)		(0.0388)
Family ownership*PDI				0.0493*	0.0498*
				(0.0264)	(0.0265)
Holding firm*PDI				0.0661	0.0808
				(0.0948)	(0.0911)
Industrial firm*PDI				0.00671	0.00266
				(0.0792)	(0.0799)
Control variables					
Business group	-0.0675	0.134	0.215	0.140	0.232
	(0.495)	(0.517)	(0.526)	(0.523)	(0.531)
Bank debt ratio	0.793**	0.790**	0.789**	0.781**	0.779**
	(0.361)	(0.361)	(0.362)	(0.362)	(0.362)
R&D share	0.764***	0.764***	0.763***	0.765***	0.763***
	(0.0514)	(0.0514)	(0.0515)	(0.0513)	(0.0514)
Active abroad	3.644***	3.654***	3.666***	3.639***	3.652***
	(0.337)	(0.338)	(0.339)	(0.338)	(0.339)
Competition	2.008***	2.002***	1.997***	1.998***	1.994***
	(0.350)	(0.350)	(0.350)	(0.350)	(0.350)
Firm size	-	-	-	-	-
Firm age	-1.248***	-1.296***	-1.286***	-1.296***	-1.284***
	(0.214)	(0.216)	(0.216)	(0.216)	(0.216)
Sector Dummies	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes
Constant	9.123***	8.621***	8.596***	8.666***	8.642***
	(1.111)	(1.278)	(1.278)	(1.280)	(1.280)
Observations	11,767	11,767	11,767	11,767	11,767
Pseudo/R-squared	0.157	0.158	0.158	0.158	0.158

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 13: Estimating the Impact of Power Contingencies on Owner Type and Product Innovation in Large European Firms

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			0.224	0.049	0.266	0.047	0.281	0.049	0.319	0.046
			(0.235)	(0.0515)	(0.237)	(0.0521)	(0.248)	(0.0520)	(0.250)	(0.0526)
Holding firm			-0.0617	-0.014	0.166	0.012	-0.119	-0.047	0.100	-0.022
			(0.335)	(0.0757)	(0.535)	(0.0920)	(0.335)	(0.0806)	(0.500)	(0.0935)
Industrial firm			-0.156	-0.035	-0.166	-0.041	-0.0588	-0.011	-0.150	-0.015
			(0.332)	(0.0769)	(0.437)	(0.0843)	(0.368)	(0.0905)	(0.438)	(0.0933)
Moderating variables										
Concentration (CONC)	0.000650	0.0001	0.00127	0.0003	0.00473	0.0002	0.00129	0.0003	0.00425	0.0003
	(0.00345)	(0.0008)	(0.00348)	(0.0008)	(0.00507)	(0.0009)	(0.00348)	(0.0008)	(0.00510)	(0.0008)
Hofstede's PDI	-0.0437	-0.010	-0.0370	-0.008	-0.0366	-0.008	-0.0555	-0.010	-0.0570	-0.0103
	(0.0616)	(0.0137)	(0.0632)	(0.0141)	(0.0631)	(0.0140)	(0.0644)	(0.0141)	(0.0643)	(0.0141)
Interaction terms										
Family ownership*CONC					-0.00564	-			-0.00520	-
					(0.00697)				(0.00697)	
Holding firm*CONC					-0.0120	-			-0.0116	-
					(0.0181)				(0.0168)	
Industrial firm*CONC					-0.00146	-			0.00532	-
					(0.0153)				(0.0162)	
Family ownership*PDI							0.0193	-	0.0189	-
							(0.0167)		(0.0168)	
Holding firm*PDI							0.0193	-	0.0294	-
							(0.0167)		(0.0202)	
Industrial firm*PDI							-0.00358	-	-0.0105	-
							(0.0255)		(0.0276)	

Table 13 continued: Estimating the Impact of Power Contingencies on Owner Type and Product Innovation in Large European Firms

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.143	0.032	0.236	0.052	0.241	0.054	0.233	0.052	0.244	0.054
	(0.231)	(0.0515)	(0.245)	(0.0545)	(0.246)	(0.0547)	(0.249)	(0.0550)	(0.252)	(0.0554)
Bank debt ratio	0.0597	0.013	0.0238	0.005	0.0165	0.004	0.0298	0.007	0.244	0.005
	(0.219)	(0.0489)	(0.226)	(0.0504)	(0.227)	(0.0505)	(0.228)	(0.0503)	(0.252)	(0.0505)
R&D share	0.0422**	0.009	0.0426**	0.009	0.0429**	0.010	0.0430**	0.009	0.0432**	0.010
	(0.0184)	(0.0041)	(0.0185)	(0.0041)	(0.0185)	(0.0041)	(0.0186)	(0.0041)	(0.0186)	(0.0041)
Active abroad	0.986***	0.220	0.984***	0.219	0.980***	0.218	0.978***	0.216	0.984***	0.217
	(0.330)	(0.0741)	(0.332)	(0.0743)	(0.333)	(0.0747)	(0.334)	(0.0743)	(0.335)	(0.0745)
Competition	0.472**	0.105	0.494**	0.110	0.491**	0.109	0.487**	0.108	0.483**	0.106
	(0.216)	(0.0479)	(0.216)	(0.0481)	(0.216)	(0.0479)	(0.217)	(0.0477)	(0.217)	(0.0476)
Firm size	-	-	-	-	-	-	-	-	-	-
Firm age	0.0886	0.020	0.0704	0.016	0.0703	0.016	0.0627	0.014	0.0568	0.013
	(0.113)	(0.0251)	(0.114)	(0.0255)	(0.115)	(0.0255)	(0.115)	(0.0253)	(0.116)	(0.0256)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	0.392		0.394		0.368		0.331		0.288	
	(0.691)		(0.713)		(0.714)		(0.718)		(0.718)	
Observations	627		627		627		627		627	
Pseudo/R-squared	0.1378		0.1396		0.1408		0.1432		0.1446	
Log pseudo-likelihood	-353.36086		-352.64032		-352.1458		-351.15388		-350.58072	
Percent correctly predicted	70.81%		70.81%		71.13%		71.61%		71.77%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 14: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation in Large European Firms

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables										
Family ownership			-0.281	-0.070	-0.335	-0.069	-0.269	-0.068	-0.313	-0.066
			(0.221)	(0.0547)	(0.225)	(0.0557)	(0.227)	(0.0549)	(0.230)	(0.0557)
Holding firm			-0.285	-0.071	-0.336	-0.071	-0.253	-0.053	-0.321	-0.058
			(0.307)	(0.0767)	(0.447)	(0.0903)	(0.318)	(0.0845)	(0.453)	(0.0950)
Industrial firm			-0.0264	-0.007	-0.544	-0.067	-0.0498	-0.015	-0.520	-0.042
			(0.347)	(0.0860)	(0.509)	(0.1008)	(0.361)	(0.0962)	(0.499)	(0.1085)
Moderating variables										
Concentration (CONC)	0.00151	0.0004	0.00143	0.0004	-0.00347	0.0006	0.00148	0.0004	-0.00334	0.001
	(0.00331)	(0.0008)	(0.00338)	(0.0008)	(0.00518)	(0.0009)	(0.00339)	(0.0008)	(0.00519)	(0.0009)
Hofstede's PDI	0.0495	0.012	0.0374	0.0092	0.0358	0.0089	0.0411	0.010	0.0361	0.009
	(0.0643)	(0.0159)	(0.0649)	(0.0160)	(0.0646)	(0.0160)	(0.0652)	(0.0160)	(0.0653)	(0.0160)
Interaction terms										
Family ownership*CONC					0.00625	-			0.00616	-
					(0.00687)				(0.00687)	
Holding firm*CONC					0.00539	-			0.00563	-
					(0.0147)				(0.0150)	
Industrial firm*CONC					0.0294	-			0.0327	-
					(0.0181)				(0.0204)	
Family ownership*PDI							0.00218	-	0.00322	-
							(0.0152)		(0.0152)	
Holding firm*PDI							-0.0126	-	-0.0110	-
							(0.0213)		(0.0213)	
Industrial firm*PDI							0.00297	-	-0.0150	-
							(0.0238)		(0.0317)	

Table 14 continued: Estimating the Impact of Power Contingencies on Owner Type and Process Innovation in Large European Firms

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Control variables										
Business group	0.0147	0.004	-0.0468	-0.012	-0.0172	-0.004	-0.0645	-0.016	-0.0363	-0.009
	(0.221)	(0.0547)	(0.231)	(0.0571)	(0.232)	(0.0574)	(0.232)	(0.0573)	(0.234)	(0.0578)
Bank debt ratio	0.249	0.0615	0.246	0.061	0.250	0.062	0.240	0.059	0.244	0.060
	(0.221)	(0.0547)	(0.227)	(0.0563)	(0.227)	(0.0564)	(0.227)	(0.0560)	(0.227)	(0.0561)
R&D share	0.0232*	0.0057	0.0230*	0.006	0.0227*	0.006	0.0228*	0.006	0.0224*	0.006
	(0.0124)	(0.0031)	(0.0126)	(0.0031)	(0.0123)	(0.0031)	(0.0125)	(0.0031)	(0.0122)	(0.0030)
Active abroad	1.395***	0.345	1.409***	0.348	1.470***	0.364	1.410***	0.349	1.464***	0.362
	(0.347)	(0.0861)	(0.346)	(0.0858)	(0.350)	(0.0869)	(0.344)	(0.0854)	(0.349)	(0.0867)
Competition	0.0789	0.020	0.0743	0.018	0.0647	0.016	0.0846	0.021	0.0753	0.019
	(0.195)	(0.0483)	(0.195)	(0.0483)	(0.196)	(0.0485)	(0.196)	(0.0485)	(0.197)	(0.0486)
Firm size	-	-	-	-	-	-	-	-	-	-
Firm age	0.0291	0.007	0.0421	0.010	0.0220	0.005	0.0477	0.012	0.0250	0.006
	(0.114)	(0.0282)	(0.115)	(0.0284)	(0.116)	(0.0288)	(0.115)	(0.0284)	(0.116)	(0.0286)
Sector Dummies	Yes		Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes		Yes	
Constant	1.195		1.215		1.261		1.220		1.224	
	(0.787)		(0.792)		(0.784)		(0.789)		(0.783)	
Observations	627		627		627		627		627	
Pseudo/R-squared	0.1167		0.1193		0.1234		0.1200		0.1243	
Log pseudo-likelihood	-381.75182		-380.64228		-378.86514		-380.33205		-378.48062	
Percent correctly predicted	64.75%		66.35%		66.35%		66.03%		66.19%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 15: Estimating the Impact of Power Contingencies on Owner Type and Innovative Products Sales in Large European Firms

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Independent variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Family ownership		0.977	1.078	0.811	0.909
		(1.451)	(1.430)	(1.624)	(1.588)
Holding firm		-3.439	-3.593	-3.523	-3.628
		(2.186)	(3.014)	(2.205)	(3.022)
Industrial firm		-4.078	-3.975	-4.186	-4.012
		(2.610)	(3.873)	(2.836)	(3.929)
Moderating variables					
Concentration (CONC)	0.0155	0.0248	0.0354	0.0240	0.0351
	(0.0230)	(0.0238)	(0.0344)	(0.0239)	(0.0352)
Hofstede's PDI	-0.107	-0.463	-0.454	-0.461	-0.450
	(0.111)	(0.426)	(0.427)	(0.423)	(0.422)
Interaction terms					
Family ownership*CONC			-0.0210		-0.0215
			(0.0506)		(0.0518)
Holding firm*CONC			0.000872		-0.00167
			(0.0962)		(0.0973)
Industrial firm*CONC			-0.0101		-0.0146
			(0.135)		(0.125)
Family ownership*PDI				-0.0324	-0.0353
				(0.0978)	(0.100)
Holding firm*PDI				0.0423	0.0390
				(0.117)	(0.119)
Industrial firm*PDI				0.0159	0.0156
				(0.208)	(0.191)
Control variables					
Business group	1.921	2.952**	-0.454	3.079**	3.019**
	(1.366)	(1.482)	(0.427)	(1.483)	(1.469)
Bank debt ratio	1.359	0.668	0.680	0.725	0.735
	(1.499)	(1.425)	(1.428)	(1.427)	(1.432)
R&D share	0.601***	0.599***	0.600***	0.600***	0.601***
	(0.102)	(0.102)	(0.102)	(0.102)	(0.102)
Active abroad	4.272***	4.257***	4.234***	4.281***	4.249***
	(1.479)	(1.515)	(1.500)	(1.514)	(1.507)
Competition	1.745	2.000	1.988	1.936	1.927
	(1.307)	(1.303)	(1.322)	(1.324)	(1.342)
Firm size	-	-	-	-	-
Firm age	-0.956	-1.145	-1.144	-1.170	-1.165
	(0.855)	(0.853)	(0.892)	(0.853)	(0.885)
Sector Dummies	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes
Constant	4.286	3.762	3.722	3.848	3.806
	(3.604)	(4.217)	(4.209)	(4.203)	(4.171)
Observations	627	627	627	627	627
Pseudo/R-squared	0.213	0.221	0.221	0.221	0.222

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 16: Description of the Variables

Variable	Description
Product innovation	Dummy for family firms that carried out any product innovation in years 2007-09
Process innovation	Dummy for family firms that carried out any process innovation in years 2007-09
Innovative products sales	The average percentage of turnover from innovative products sales for family firms.
Family ownership	Dummy for top shareholder an individual or group of individuals, and if a firm is directly or indirectly controlled by family-owned entity
Holding firm	Dummy for top shareholder a holding firm
Industrial firm	Dummy for top shareholder an industrial firm
Concentration (CONC)	Percent of shares owned by a top shareholder. It can take values between 0 and 100.
Hofstede's PDI	An index, which relate to one of the four dimensions of Hofstede. This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. It measures the characteristics of societies that have lower or higher power distance. It can take values between 11 and 68.
GLOBE power distance	The degree to which members of a collective expect power to be distributed unequally. It can take values between 5 and 5.68.
Business group	Dummy for business group: if a firm belongs to a business group (foreign or national)
Bank debt ratio	A family firm's share of bank debt over the total external financing. It can take values between 0 and 1.
R&D share	A family firm's R&D expenses as percentage of the firm total turnover in 2008. It can take values between 0 and 100.
Active abroad	Dummy if a family firm is active abroad, and these activities can include exports or imports (either nearby or to a global market), or when a firm reports having a production activity contracts and agreements abroad, or when a firm is running at least part of its production activity in another country via direct investments.
Competition	Dummy for competition from abroad: the firm has competitors abroad
Firm size	Logarithm of the total number of employees in a family firm in a respective home country in 2008.
Firm age	Logarithm of the number of years a family firm operates in a respective market.
Sector	Dummies for sectors according to 2 digits of the NACE 2 rev.1 classification.
Country	Dummies for countries included in the sample (Austria, France, Germany, Hungary, Italy, Spain and the UK)

Essay 2: Non-Family Managers and Innovation in Family Firms: The Impact of Decentralization

Abstract

The effect of family ownership on innovation is a subject of immense debate. While family firms are often characterized as risk-averse and sluggish, under certain circumstances, they can be quite innovative, and even more efficient in their innovation process than other firms. We explore two contingencies in family firms and their effect on innovation, namely the presence of non-family managers and the use of decentralization, as ways to enhance innovation in family firms. Our analysis of 10,365 European family firms shows an inverted-U shaped relationship between the proportion of non-family managers and innovation in family firms. We explain this relationship by arguing that the positive effect of non-family managers on innovation may diminish due to an unfair redistribution of rents and incentives. We also show how the presence of decentralization can shift the turning point of this relationship, helping family firms to achieve higher innovative outcomes.

Keywords

Decentralization; Non-family managers; Product and process innovation

1. Introduction

Family firms are not considered particularly innovative, and they have often been labeled as conservative, risk-averse, with a slow decision-making process, and reluctant to grow. Family firms, however, tend to have a more long-term orientation, a feature that does favor innovation (Carney, 2005; Chrisman, Chua, De Massis, Frattini, & Wright, 2015; Kraus, Pohjola, & Koponen, 2012). In fact, most firms strive for the competitive advantage that an innovation can grant them over their rivals. In the context of a family firm, the controlling family plays a core role in shaping its strategy (and also their innovation initiatives). However, the distinction between the role of a principal and the agent at the time of exercising ownership, control and management in family firms tends to be rather flexible as compared with the non-family firms (Kammerlander, Dessì, Bird, Floris, & Murru, 2015; Peng & Jiang, 2010). More precisely, agency theory predicts that agency costs are less destructive in family firms than in non-family firms due to the presence of altruism and kinship in the former (Karra, Tracey, & Phillips, 2006). A source of the agency dilemma in family firms has been viewed, however, in the clashing interests between the employed family members on one side, and the non-family owners or managers on the other (Klein & Bell, 2007), or in the ownership dispersion at the later stages of a family firm life cycle (Schulze, Lubatkin, & Dino, 2003). In relation to the non-family managers, the presence of career opportunities may motivate non-family managers to "do well", while their absence at the workplace may lead to managerial dissatisfaction and limited commitment towards a family firm (Block & Jaskiewicz, 2007). Nevertheless, those family firms pursuing innovation typically require a proportion of non-family workforce to bridge the gap between a family employees' firm-specific and outsiders' industry-specific knowledge to strengthen their cutting edge innovation. Hence, we argue that one important issue is to know how the governance mechanism triggers different attitudes towards innovation in those non-family managers working for family firms.

Managerial practices explain an important part of the heterogeneity in firms' performance (Bloom, Genakos, Sadun, & Van Reenen, 2012). Undoubtedly, family-related factors and contingencies also shape the way how innovation initiatives are operationally managed. There exists a number of contingency variables (i.e., family stage, firm size, firm hazard, presence of non-family shareholders) that have been

theorized to impact a family firm's organizational governance and managerial processes (Gomez-Mejia, Cruz, Berrone, & Castro, 2011). Less has been shown, though, on the impact of operational factors like the autonomy or decentralization in family firms. In particular, decentralization has proved to impact positively on firm's performance (Aghion, Bloom, Lucking, Sadun, & Van Reenen, 2015; Bloom, Sadun, & Van Reenen, 2010). Despite this fact, family owners or managers do not seem to favor delegating decision power to the lower ranks' employees, especially if they are not bonded by blood or relationship with the controlling family. Recently, Bloom et al. (2012) found that, due to the importance of trust, the number of adult male family members was the key determinant of family firm size in India. They concluded that "owners trusted only other male family members to make major managerial decisions, as they worried that outsiders would steal from the firm" (Aghion, Bloom, & Van Reenen, 2013; Bloom et al., 2012).

Some family firms, however, report applying decentralized decision-making in their managerial systems. The empirical evidence in our study shows that decentralization not only increases a family firm's product and its process innovation in comparison to those family firms with centralized decision-making systems. It also enhances their ability to appropriate of innovation profits. In fact, our results show that applying decentralization can become a unique attribute in family firms helping them to surpass non-family firms in their ability to capture higher profits generated by innovations. Moreover, it has been theorized that family firm's inability to appropriate the results of innovation becomes as harming to their innovative performance as their fear of losing control over core competencies (De Massis, Frattini, Pizzurno, & Cassia, 2015). In this context, decentralization becomes a highly attractive managerial tool in family firms. Furthermore, we argue that decentralized decision-making systems can help non-family managers to thrive in the setting of a family business, and its socioemotional agenda. In this study, we show that decentralization can help create more self-actualization opportunities for non-family managers and, as a result, stimulate them to help the family firm (also in terms of its innovation). Hence, decentralization may become a key instrument fostering a family firm's willingness to innovate. In addition, we argue that applying decentralization is less costly and more easily reversible than other strategic ways to deal effectively with unequal power relations within a firm.

Using a survey data on European firms provided by Bruegel-Unicredit and collected within the European Firms in a Global Economy (EFIGE) project, we empirically investigate these relationships. Our findings offer statistically significant support for our arguments, showing that an inverted U-shaped relationship between a ratio of non-family managers and innovation output in family firms does exist. We also show that decentralization shifts the turning point of this curve to the right.

This paper proceeds as follows. Section 2 draws the theoretical model and presents our hypotheses, section 3 describes the EFIGE data, and section 4 presents our findings. In the 5 section, we discuss our results together with their implications. Finally, section 6 provides the concluding remarks, limitations and also proposes future research directions.

2. Theory and Hypotheses

Family firms are exposed to complex governance challenges. Family involvement may minimize the agency problems present in an organization (Schulze et al., 2003), but it may also jeopardize a family firm by contributing to the entitlement of family employees, the presence of double moral hazard, and power fights in the succession process (Meier & Schier, 2016; Schulze et al., 2003). More precisely, a family principal typically shows a long-term orientation and, therefore, has a greater incentive to increase the firm's long-term value (Anderson, Mansi, & Reeb, 2003; Peng & Jiang, 2010). However, the presence of a "family agency" can bring some negative consequences to the firm as we have mentioned earlier. As a result, the benefits gained by the family involvement may be offset by family members' free riding, the entitlement to use firm's resources for private benefits, or the parents' inability to monitor and discipline employed offspring (Meier & Schier, 2016; Schulze et al., 2003). Despite the fact that kinship can urge family members employed in a family firm to pursue the best actions for the whole family, some personal conflicts between different family members can also be transferred on the whole firm, and cause a divergence of interests. This lack of focus on one strategic direction, together with increasing agency costs, can harm any family firm's performance, and also its innovation.

The socioemotional wealth (SEW) approach provides another explanation for the controlling family's antipathy concerning innovation and growth. It argues that "family

owners frame problems in terms of assessing how actions will affect socioemotional endowment" (Berrone, Cruz, & Gomez-Mejia, 2012). These authors reason that "any threat to SEW means that the family is in a "loss mode" and, therefore, will make strategic choices that will avoid these potential SEW losses" (Berrone et al., 2012). They support the view that family firms behave rather conservatively and show unwillingness to allocate resources outside of known patterns (König, Kammerlander, & Enders, 2013).

With all its distinctive characteristics a family business becomes a "tough" managerial challenge. In the next subsection, we provide some arguments that can bring more light into the role of non-family managers on family firm innovation.

2.1. The Inverted U-Shaped Relationship of the Ratio of Non-Family Managers on Innovation in Family Firms

Managers are the ones who can either "make or break" the organizational growth strategy, regardless of how brilliantly owners, board members or shareholders planned it (Bloom et al., 2012; Kanter, 1982). Thus, successful innovation (i.e., innovation development, innovation adoption) requires focused and deliberated management (Spriggs, Yu, Deeds, & Sorenson, 2012). In the management team of a family firm, family and non-family managers collaborate to carry out strategic plans, but they contribute to a different extent due to their individual characteristics and kinship.

There are a number of reasons to believe that non-family managers may be associated with enhanced family firm's innovation. Managers recruited from outside of the firm tend to undergo a more selective hiring process than the family managers. In this process, and to minimize the threat of adverse selection problems (Klein & Bell, 2007), non-family managers need to show their past achievements and prove their ability to solve complex problems. Hence, family firms hire non-family managers conditioned to the fact they will bring an industry-specific experience and tacit knowledge into a family firm. We argue that the effect of this ability, combined with a riskier outsider's attitude, helps to strengthen a family firm's innovative outcomes.

However, the downside of hiring non-family managers could come from their lack of a deep firm-specific knowledge, which family members employed in a firm can develop over time, or the problems that a non-family workforce may encounter on the identification issues with the family business. Moreover, we argue that at the time of

hiring non-family managers, family firms are exposed to higher agency costs. More specifically, with an increasing proportion of non-family managers in the management team the monitoring costs increase, together with the information asymmetry between family and non-family managers. As a higher proportion of non-family managers join the family firm, a number of diverging interests between the family and non-family managers, or within the group of non-family managers, can arise. On one hand, the presence of altruism can temper the self-interest of those family members employed in the firm but, on the other hand, it can also alter the incentive structure of a firm (Schulze et al., 2003). Family managers may feel entitled to use the family firm's resources to achieve privileges that they would not receive otherwise, and this will have a negative impact on the perception of fairness by those non-family managers working in a family firm. As a result, non-family managers may become inclined to consume higher levels of private benefits. Their opportunistic behavior may be driven by the fact that, as an outsider group of employees, they are bearing lower costs from their failures, but they collect also lower rewards from their successes.

In this context, family owners will become reluctant to hire additional non-family managers in their management teams beyond the desired optimum to maximize their innovative outcomes. Despite this fact, we observe that there exist reasons that can lead family owners to do so. First, it could be a naïve decision on the part of the controlling family overestimating the positive link between non-family managers and firm's innovation, when pushing for higher innovative outcomes. Hence, family owners and managers may become a subject to bounded-rationality while coping with issues of hiring non-family managers (and possibly they may also not have a relevant experience in this process) (Chrisman, Memili, & Kaustav, 2013). Second, a higher proportion of non-family managers can help dilute a problem of double moral hazard within a family firm. That is, the non-family managers' objectivity and contribution in the management team can help legitimize the controlling owner's decisions in the eyes of family managers. Hence, family managers will become discouraged to invest resources in monitoring their principal's behavior as they will view a lower risk in her undertaking of investments which may not benefit the whole family (and the firm) (Schulze et al., 2003).

As we have shown above, the family firms may be unable to locate their exact benefit and cost curves at the time of hiring non-family managers, thus missing the optimum in

their strategic choice. Furthermore, even if a family firm realizes its "optimum", switching from an early strategic path to a "different optimization trajectory" may be viewed as too costly or risky (Teece, Pisano, & Shuen, 1997) by family owners or managers. In addition, laying off non-family employees would hurt the owning family reputation or brand.

In summary, we argue that the benefits of the non-family managers' ability linearly increase family firms' innovation. However, the interrelated agency costs escalate rapidly with an increasing proportion of non-family managers in the family firm. When combined together, those effects reveal the "net effect" of the proportion of non-family managers on family firm's innovation. That is, a family firm's innovation first increases with the proportion of non-family managers at a decreasing rate to reach a maximum, after which family firm innovation decreases at an increasing rate. We suggest to test the following:

H1. There will be an inverted U-shaped relationship between the ratio of non-family managers in the management team and the family firm's innovation.

2.2. The Moderating Effect of Decentralization on the Ratio of Non-family Managers and Innovation in Family Firms

Non-family managers showing an entrepreneurial mindset remain in high demand due to the proven track of their ability to achieve high returns on economic leadership. Bloom et al. (2010) considered that decentralization can foster such a mindset and grants managers the ability to mobilize both people and resources to get things done. This, in turn, stimulates them to collaborate and produce results, rather than protect their "territories", wait for the principal's instruction, or get stuck in bureaucratic procedures (Kanter, 1982). Given certain power to make strategic decisions, managers tend to act beyond their formal positions, stretching the limits of their resources and power, endorsing new ways of doing things and stimulating the culture for innovation and inclusiveness. In particular, family owners may use decentralization to enhance the experimentation and the trial-and-error culture within their firm. We argue that, once given power to make decisions, non-family managers will find a higher incentive to search for that relevant knowledge that can enhance their ability to take better decisions, including those related to risky innovative projects (Schulze et al., 2003).

Miller, Breton-Miller, Corbetta & Pittino (2014) have found that the non-family CEOs' (and this may apply also to other non-family managers) performance is highly sensitive to the contextual aspects of family leadership. More precisely, they claim that non-family managers thrive once given "the freedom from interference by powerful family executives distracted by an SEW (socio-emotional wealth) agenda" (Miller et al., 2014). Hence, given some decisive power to take strategic decisions, non-family managers may view it as a privilege, or as a recognition from the founding family and, if so, this can mitigate some issues related to their identification with the family firm. Accordingly, decentralization may have positive effects on the management of family firms in that: (1) it diminishes the sense of entitlement of family managers; (2) non-family related managers are granted more opportunities for their self-actualization beyond the economic rewards; (3) it further decreases the risk of the occurrence of double moral hazard (i.e., a central planner cannot freely undertake all strategic decisions).

Family owners, however, may be concerned that applying decentralization may limit the acquisition of skills among the managers within their firm. As a result, they may decide to go back to a central decision-making system. If managers lose their decisive power, they can take unobservable actions, which may be harmful to the firm (Aghion et al., 2013). Nevertheless, an owner of a firm closely positioned to the technological frontier has few incentives to revert a choice concerning decentralization. In fact, there are several reasons to keep delegation: (1) innovative organizations face unique problems, and many times there is no benchmark to validate the outcome of their investment decisions; (2) acquiring technological skills requires a lot of time and effort; and (3) a decentralized decision-making system encourages managers to invest more effort in knowledge acquisition, i.e., it strengthens the initiative effect (Aghion et al., 2013).

To sum up, we argue that decentralization may serve as a mechanism that helps redistribute the power between family and non-family managers, and that can extend managers' short-term drive to a longer term commitment with positive effects on family firm innovation. Following this view, we see that decentralization influences the agency position of individual managers in such a way that they become more willing to adopt decisions in favor of innovation, bearing the risk that innovation poses to their individual wealth. Thus, those non-family managers that have received certain power to undertake

strategic decisions tend to act as proactive innovators, and they can also manage to skillfully counterbalance the interests of various stakeholders. Bringing all this together, we propose to test the following:

H2. There will be an interaction effect between decentralization and the ratio of non-family managers on a family firm's innovation. That is, the presence of decentralized decision-making will shift the turning point of the curve right.

Insert Figure 1 about here

3. Data and Method

3.1. Sample

To test our hypotheses we use data about firms located in the territory of European Member States and, more specifically, in Austria, France, Germany, Hungary, Italy, Spain and the UK. The data captures firm's outcomes of international operations, and contains variables, among others, on firm's governance, R&D and technological innovation. It has been provided by Bruegel-Unicredit and collected within the European Firms in a Global Economy project (EFIGE) supported by the Directorate General Research of the European Commission (Altomonte & Aquilante, 2012). Scientific partners of the project include some National Central Banks (Bundesbank, Bank of France, Bank of Italy, Bank of Spain, Bank of Belgium) and international institutions (OECD) (Altomonte & Aquilante, 2012). Data collection has been performed through a survey carried out in 2010 by GFK, the fourth largest market research company in the world. The questionnaire submitted to the firms covered six different broad areas, and these were: (1) structure of the firm (company ownership, domestic and foreign control, management); (2) workforce (skills, type of contracts, domestic vs. migrant workers, training); (3) investment, technological innovation and R&D (and related financing); (4) export and internationalization; (5) market structure and competition; and (6) the financial structure and bank-firm relationship.

In order to ensure standard statistical representativeness of the collected data, the dataset has been built so as to fulfill three criteria: (1) the availability of an adequately large target sample of firms, (2) a minimum response rate of 85-90% for 5 to 10 key questions previously agreed; (3) a proper stratification of the sample in order to ensure representativeness of the collected data ex-ante and ex-post for each country

(Altomonte & Aquilante, 2012). Furthermore, to achieve targets in terms of representativeness and ensure an appropriate randomization, the estimated number of 135,000 firms to contact for all 7 countries has been estimated. Finally, to validate the survey, a pilot exercise in which 100 firms from large countries and 50 firms from small countries have been interviewed (Altomonte & Aquilante, 2012).

As a result, EFIGE data includes information about 14,759 family and non-family related organizations with a threshold higher than 10 employees. In this study we focus solely on the family firms[3], which shrinks the original sample down to 10,365 firms. The information collected is cross-sectional for the budget year 2008. In addition, EFIGE data have been integrated with balance sheet data drawn from the Amadeus database managed by Bureau van Dijk.

3.2. Variables

We want to analyze the non-family managers' attitude towards innovation in family firms, and their impact on innovation performance. As mentioned above, we have used a large dataset of European family firms. It allows for a broader analysis of an individual family firm without setting the limitation of one specific country. Therefore, we consider that our findings can be applied in family firms in the context of various European countries.

3.2.1. Dependent Variables

Product innovation is, as a technological innovation, precisely defined as "the implementation/commercialization of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer"; whereas a technological process innovation is defined as "the implementation/adoption of new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or a combination of these" (Hagedoorn & Cloodt, 2003; OECD/Eurostat, 2005). In line with the definitions above, the EFIGE data provided information on the European firm's technological innovation

[3] The EFIGE data includes only limited information about the controlling family. Some questions included in the EFIGE survey indicate on the presence of family ownership, or if a firm is directly or indirectly controlled by an individual or family-owned entity, or the number of actively working family managers in a firm.

and R&D. Using this information, we have created the following innovation measures of European family firms: (1) "product innovation"; (2) "process innovation"; (3) "innovative products sales". Precisely, the dependent binary variables "product innovation" and "process innovation" indicate if European firms reported implementation of a new or improved product or a technological process innovation. Binary variables due to their nature take the value of 1 if an organization reports its involvement in the respective innovative activities, or 0 otherwise. Out of the total sample of 10,365 family owned firms, 6,790 of them reported implementing product innovation or process innovation. Over 42% of those family firms reported engaging in both, product innovation and process innovation, and over 32% only in product innovation, whereas over 24% report innovating only in processes. We consider the measures of product innovation and process innovation as it was defined in the EFIGE survey.[4] Another measure used to capture the European firm's innovation corresponds to their average percentage of turnover from innovative products sales, and has been labeled as "innovative products sales" (Hitt, Hoskisson, Johnson, & Moesel, 1996). It is a continuous variable and can take values between 0 and 100.

Finally, innovation surveys, and this is also the case of the EFIGE survey, label product and process innovation as "technologically" new or improved innovations that are the outcome of an innovation process at the individual firm level. We do not have all the information specifying if a particular innovation introduction in those family firms that belong to a group has been organized through the whole group, or in a specific country, or market.

[4] The question included in the EFIGE survey asks the following: On average in the last three years (2007-2009), did the firm carry out any … (multiple answers allowed):
- product innovation (i.e. introduction of a good which is either new or significantly improved with respect to its fundamental characteristics; the innovation should be new to your firm, not necessarily to the market)
- process innovation (i.e. the adoption of a production technology which is either new or significantly improved; the innovation should be new to your firm; your firm has not necessarily to be the first to introduce this process)
- none of the above

3.2.2. Independent Variables

To explore the effect of non-family managers on the innovation activity in family firms, we have included an independent variable that captures the share of non-family managers in their management team. It has been labeled as the "non-family managers' ratio" and can take values between 0 and 1. It is a proxy that measures the level of non-family managers' involvement in managing a given family firm. Specifically, the "non-family managers' ratio" measures a number of non-family managers over the total number of managers in the team. We have also included the squared value of this ratio to test the effect of an intense presence of non-family managers on the innovation performance in family firms. Table 1 presents the percentiles corresponding to the number of non-family managers in family firms. We observe that the average number of non-family managers per family firm is around 4.77 managers.

Insert Table 1 about here

3.2.3. Moderating Variable

Concerning the decentralized decision-making practices within family firms, we use a binary variable "decentralization" contained in the survey[5] to measure this phenomenon. As we have mentioned earlier, decentralization means that managers take autonomous decisions in strategic business areas, otherwise family firms report that solely an owner/CEO takes most decisions in every area. The binary variable "decentralization" takes the value of 1 if the owner/CEO delegates the authority to make strategic decisions to managers, and 0 otherwise.

3.2.4. Control Variables

To control for externalities and the specificity of the EFIGE data we have included the following control variables in our models: (1) "family CEO"; (2) "bank debt ratio"; (3) "R&D share"; (4) "active abroad"; (5) "competition" (6) "firm size"; (7) "firm age."

More specifically, the binary variable "family CEO" takes the value 1 if the CEO of a family firm is also a family member, and 0 otherwise. It serves to control for the impact

[5] The question included in the EFIGE survey asks the following: With reference to strategic decisions which of the following statements better describe your firm situation? Decisions in your firm are…?
- … centralized: the CEO/owner takes most decisions in every area.
- … decentralized: managers can take autonomous decisions in some business areas.

of family CEO on the non-family managers and innovation in family firms. The total of 88.50 % of family firms from EFIGE sample reported having a family CEO in their firms. Due to the fact that the EFIGE project collected information about European firms at the time of the 2007-2008 financial crisis, we include a variable "bank debt ratio" to control for its effect. It is a discrete variable that can take values between 0 and 1, and reflects a firm's share of bank debt over the total external financing. Typical explanatory variables of innovation in econometric models include variables related to R&D, activities abroad, competition, firm size and firm age. Hence, we have included a continuous variable "R&D share" takes values between 0 and 100 corresponding to family firm's R&D expenses as percentage of the firm total turnover in 2008. Furthermore, we include a binary variable "active abroad" that takes value 1 if a family firm is active abroad, and these activities can include exports or imports (either nearby or to a global market), or when a firm reports having a production activity contracts and agreements abroad, or when a firm is running at least part of its production activity in another country via direct investments, and 0 otherwise. It also captures the fact European family firms operating within EU can benefit from the single market. Competition from nearby markets within the boundaries of the EU can also impact the family firm's attitude towards innovation. In our models, a binary variable "competition" takes value 1 if a family firm reports competing with other firms from abroad. Firm size is also an important variable that can explain family firm's innovative aspirations. We include a continuous variable of firm size that indicates the total number of employees in a family firm in a respective home country in 2008. Finally, in relation to firm age, previous research has debated about the importance of the presence of the founder on firm's innovation performance. Many innovation scholars agree that a founder can have a tremendous impact on the firm's performance, and on its innovation performance (Villalonga & Amit, 2006). We do not have this information in our data but, to control for the founder's effect in family firms from our sample, we have introduced a continuous variable 'firm age' in our models. Hence, it also discounts for the fact that one generation of a family has already managed the family firm, and possibly a next generation of family members have joined the workforce. The variable 'firm age' captures the number of years a family firm operates in a respective market. Both variables, firm size and firm age, enter our models in a log-linear form due to skewness

of their distribution. We have also included a set of dummies that take a value of 1 for each sector (2 digits of the NACE 2 rev.1 classification), and for the countries considered in the EFIGE sample.

3.3. Method

Due to the binary nature of our dependent variables, we use a logistic regression as our estimation approach, reporting both the coefficients and the marginal effects. Furthermore, in order to test the moderating effect of the variable "decentralization" on the relationship between "non-family managers' ratio" and the family firm's innovation output, we follow the methodology by Aiken and West (1991), later extended by Dawson (2014). In addition, we run simple regression models to test the impact of our dependent variables on the family firm's "innovative products sales." For calculations of the turning point in the shifting curves in the aftermath of introducing "decentralization", we follow the methodology described by Haans, Pieters and He (2016).

3.4. Descriptive Statistics

Over 49% of the European family firms in our sample report innovating in products, and over 44% of them innovating in processes. They have also reported an average 9.90% of turnover coming from their innovative products sales. In terms of non-family managers employed in management teams, family firms report, on average, a 44.90% presence of non-family members. In our sample, slightly over 24% of all family firms apply decentralized decision-making systems. That is, in the EFIGE survey they have indicated that strategic decisions in their firms are undertaken autonomously also by managers (*see table 2*).

Analyzing the differences between family firms that have reported product or process innovation and those non-innovative family firms, we find that the former have a higher share of non-family managers in their management team (the significant difference equals to over 6% of higher ratio on average in those innovate family firms) (*see table 3*). According to our data, family CEOs of European family firms do not favor innovation as much as CEOs from outside the family. Those firms managed by a family CEO report, on average, 2.93% lower probability to engage in product or process

innovation. In addition, we find that those family firms that apply decentralization innovate more (with over 8% higher probability to innovate in products or processes) than those family firms with centralized decision-making systems.

Finally as a check for multicollinearity, we have calculated variance inflation factor (VIF) scores for all variables. As shown in Table 4, all VIF scores were below 3, suggesting that multicollinearity was not a problem in our analysis. In addition, table 12 in appendix provides a description of all variables used in our estimation models.

Insert Table 2 about here

Insert Table 3 about here

Insert Table 4 about here

4. Results

4.1. Estimated Models

In this section we provide an overview of the impact of non-family managers on innovation in family firms and we also present the results of the moderating effect of decentralization on this relationship. More specifically, we present 4 estimation models. Model 1 shows the results of a logistic regression of the impact of the control variables and the moderating variable "decentralization" together with sector and countries dummies on innovation in family firms. Model 2 presents the results of the linear impact of the ratio of non-family managers and decentralization on family firm's innovation. Model 3 also includes the squared term of the "non-family managers' ratio", whereas model 4 shows the results of the interaction term between the "ratio of non-family managers", its squared term, and decentralization.

Table 5 reports the results of the specification which captures the effect of the ratio of non-family managers and decentralization for the case of product innovation. Table 6 shows how these relationships impact family firm's process innovation. Finally, table 7 presents the results of the same specification with respect to the innovative products sales. In all these tables, we report, first, the coefficient estimates and, second, the estimated change in the probability of each innovation (if the corresponding econometric method requires it) together with the standard errors on this change.

Concerning hypothesis 1, our results imply that there exists an inverted U-shaped relationship between the "non-family managers' ratio" and "product innovation". That

is, the results of model 3 in table 5 show that, first, we find a positive (β = 0.577, p < 0.01) and significant impact of the "non-family managers' ratio" on family firm's "product innovation" but, second, after reaching a turning point, this impact becomes negative (β = - 0.597, p < 0.01). In other words, these results indicate that family firms exhibit an inverted U-shaped relationship between the ratio of non-family managers and product innovation. Those family firms with a higher ratio of non-family managers appear to experience a slightly decreasing relationship between the proportion of non-family managers and firm product innovation, indicating somehow, that increasing further the proportion of non-family managers may, slowly decrease their product innovation. Overall, the probability to innovate in family firms employing non-family managers in their management team, increases by 1.0 percentage point. This means that, keeping everything else constant, family firms with a higher proportion of non-family managers in their management team are more likely to innovate than those family firms solely employing family managers in their management team. In terms of the impact of the ratio of non-family managers on process innovation, we do not find supporting empirical evidence for hypothesis 1 (*see table 6, model 3*). However, we find that there exist an inverted U-shaped relationship between the ratio of non-family managers and the family firm's innovative products sales (*see table 7, model 3*). There, we also find a positive and significant (β = 4.101, p < 0.01) impact of "non-family managers' ratio" on family firm's "innovative products sales" but, again, after reaching the optimum point of this curve it turns negative (β = - 4.827, p < 0.01).

Insert Table 5 about here

Insert Table 6 about here

Insert Table 7 about here

Concerning hypothesis 2, our results imply that "decentralization" at conventional level increases the probability that a family firm innovate in products (by over 3.4 percentage points) and processes (by over 4.9 percentage points), and increases family firm's innovative product sales by 7.31 percent (*see tables 5-7, model 3*). At its moderating level, we find that "decentralization" shifts the turning point of the inverted-U shaped curve. More precisely, the coefficients of the impact of the "non-family managers' ratio" on "product innovation" in model 4 (β = 0.520, β = - 0.677) are statistically significant at the 0.05 level, but only the first coefficients of the interaction

term (β = 0.923, β = - 0.275) appears significant at the 0.1 level (*see table 5, model 4*). More precisely, the estimated turning point for this curve equals to 0.4829 (Haans, Pieters, & He, 2016). In the aftermath of introducing decentralization, the new optimal apex is formed at 0.7576. That is, those family firms applying decentralization show a higher optimization trajectory than otherwise. That is, the turning point shifts by 0.2658 (Chi-squared = 50.59, $p < 0.01$) after decentralization is applied. In terms of the moderating effect of decentralization on the relationship between the "non-family managers' ratio" and "process innovation", we do not find supporting empirical evidence there. The coefficients capturing this effect appear nonsignificant (*see table 6, model 4*). However, the empirical evidence supports our prediction with respect to family firm's innovative products sales. The effect of the ratio of non-family managers on innovative products sales is positive although nonsignificant (β = 2.155), and of its squared term negative and significant (β = - 3.570, $p < 0.1$), also the coefficients of the interaction term (β = 12.80, $p < 0.01$; β = - 8.899, $p < 0.05$, respectively) are statistically significant. In addition, the estimated turning point for this curve is 0.4248. In the aftermath of introducing decentralization, the new optimal apex is formed at 0.5996. That is, those family firms applying decentralization show a higher optimization trajectory than otherwise. Hence, the turning point changes by 0.0853 (Chi-squared = 44.92, $p < 0.01$) after decentralization is applied.

To test the significance of the moderating effect of decentralization on the relationship between the ratio of non-family managers and innovation, we have also computed the simple slopes at meaningful values of the moderator (Dawson, 2014; Haans et al., 2016). We run the simple slopes tests for those relationships when decentralization takes the value 1 if family firms report having a decentralized decision-making system, and the value 0 for those family firms with centralized decision-making systems. Our results reveal a significant slopes differences for product innovation (dy/dx = 0.1025, $p < 0.01$) and innovative products sales (dy/dx = 2.7163, $p < 0.01$). Whereas, the average marginal effect on outcome probability of process innovation that equals (dy/dx = 0.0116) remains non-significant.

To illustrate how decentralization increases the effect of the ratio of non-family managers and innovation performance, we have also graphed the average marginal effect of the ratio of non-family managers on innovation performance condition

decentralization (*see figures 2-4*). In those figures we can see how "decentralization" shifts the turning point of the inverted-U shaped curve to the right, allowing for more non-family managers in the teams.

In summary, our results clearly show that decentralization strengthens the positive link between the ratio of non-family managers in the case of product innovation and innovative products sales in family firms, shifting the optima of both curves further right.

Insert Figure 2 about here

Insert Figure 3 about here

Insert Figure 4 about here

4.2. Robustness and Endogeneity

To check the robustness of our models, we have run several additional tests. The results are presented in tables 8-10 of the appendix. Respectively, table 8 tests the robustness of our results for product innovation, table 9 for the process innovation, and table 10 for the innovative products sales. Models 1 and 2 in each table show the results when splitting the EFIGE sample by family firms' size. The model 1 corresponds to those family firms that were classified as SME, and model 2 for those large family firms. Model 3 presents the results of our estimation when all independent variables as well as control variables are scaled by firm size (the logarithm of number of employees). Finally, in model 4 we use a new variable that similarly to "non-family managers' ratio" captures the involvement of non-family managers in family firms: the natural log of the difference between the total number of managers and the number of family managers in family firms. The results of our robustness check confirm that "decentralization" does enhance the family firm product innovation and innovative products sales by shifting the turning point of the respective curves to the right. We also find that this effect is stronger in European SMEs. Furthermore, the results in models 3 (scaled by the logarithm of number of employees) of tables 8-10 show highly significant coefficients of the moderating effect of decentralization on the relationship between the non-family managers' ratio and innovation, i.e., product innovation, process innovation and the innovative products sales

Insert Table 8 about here

Insert Table 9 about here

Insert Table 10 about here

Finally, we also address the potential endogeneity issues of the variable that measures the ratio of non-family managers in our estimations. More precisely, it might be that hiring a higher proportion of non-family managers by family firms is just a manifestation of a different mindset (preferences) of the family owners. That is, the more non-family managers in the management team of a family firm, the more "open" the family's mindset (less afraid of losing control over the firm, etc.), and therefore the more likely to engage in innovation. If this is the case, the variable "non-family managers' ratio" could be an endogenous variable. To control for this potential endogeneity problem, we have tested our models using an instrumental variable, the "graduates' ratio." The ratio of graduates in the workforce captures the proportion of university graduates on a total personnel in a family firm. As we have mentioned earlier, the non-family managers tend to be hired due to their merits. Certainly, a family owner will prefer to employ a highly-skilled family member over a highly-skilled non-family member. The "graduates' ratio" econometrically appears to be a valid instrument (both "non-family managers' ratio" and "graduates' ratio", and their squares, are correlated and statistically significant at the 0.01 level), but it cannot be considered a perfect instrument. On the one hand, it does tackle the wrong assumption that more "open" family owners hire a higher proportion of non-family managers. That is, we show that an innovation prone family owner tend to hire more skilled employees, either family related or outsiders. On the other hand, firms with higher proportion of university graduates tend to be more innovative. Nevertheless, testing a potential endogeneity problem requires using an instrument even if it cannot be considered a perfect instrument. Therefore, we have run a two-stage least squares regressions using the "graduates' ratio" as a next step. For this purpose, we follow a procedure as explained by Haans et al. (2016), and instrumented the "non-family managers' ratio" and its squared term separately in the first stage. In the second stage, due to the nature of our binary dependent variables, "product innovation" and "process innovation", we have run logistic regressions, and for the "innovative products sales" we run an ordered least squares regression. The results of this analysis are reported in table 11 of the appendix. Again, we find that an inverted U-shaped relationship between the "graduates' ratio" and "product innovation", or "process innovation", or "innovative products sales" does

exist. There, we also report the results of the Hausman test between the basic and the instrumented models. Only for the case of product innovation, we find a weak evidence of endogeneity (Chi-squared = 43.86, $p < 0.1$).

Insert Table 11 about here

5. Discussion

We approach the problem of innovation in family firms and the role that the presence of non-family managers and the delegation of decision-making may have. Our findings show that a family firm's incentives to innovate can be overshadowed by the presence of agency relations and organizational problems. Possibly, the risks involved and the possible consequences associated with innovative projects may be unequally spread among family and non-family employees in the firm. This study provides evidence that those family firms that manage to stay at their optimal trajectory of the proportion of non-family managers in their management team do perform better in terms of their product innovation and innovative products sales. One possible interpretation could be that with the increasing presence of non-family managers in a management team, non-family managers achieve more bargaining power to pursue their innovative vision for the firm, and this facilitates the adoption of further product innovations by the firm. However, in our analysis we also uncover the presence of an inverted U-shaped relationship between the proportion of non-family managers and firm innovation. Our interpretation is that the positive effects of the presence of non-family managers combined with the negative costs rising due to some agency costs eventually harms product innovation, as well as the innovative products sales. This could be the case for a variety of reasons: (1) the increased information asymmetries among owners and managers; (2) a coordination problem may occur when many independent decisions are being made simultaneously in a family firm, and this may cause a loss of focus on the innovative strategy to be followed by the firm; (3) the presence of high transaction costs at the time of sharing the information about the decisions among managers with different objectives.

Our findings also show that to minimize those costs and become more innovative, a family firm can apply, above other strategies, decentralization. We show that, in our sample, decentralization helps redistribute the decision power within management in a

family firm in a more fairly way. We have argued that decentralization can serve as a tool that reduces the agency costs on the side of non-family managers in family firms due to the following effects: (1) it enhances non-family managers' self-actualization opportunities, a process that may incentivize these managers to take action; (2) it prevents a too-strict control mechanism; (3) it strengthens a more proactive and innovative behavior in the firm's managers.

6. Conclusion

Due to the importance of family firms in the European economy, a better understanding of the conditions that enhance the family firms' innovation performance bears relevance for economic development. To date, the existing research has shown that, on one hand, family firms tend to innovate more due to their long-term orientation while, on the other hand, internal conflicts and the fear to added risk and loss of control can paralyze the innovation decision making, while it favors an excessive control over the family firm. The results of this study have important implications for family firms. We show the evidence that non-family managers can become a double-edge sword on family firms' innovation, and decentralization positively moderates this relationship.

More precisely, our main contribution in this study is that we extend the view on non-family managers through the lenses of the agency theory. We show that non-family managers can be both stewards and agents in a family firm. That is, the presence of non-family managers in family firms increases the innovative output in one hand. But, on the other hand, innovation is reduced for high levels in the proportion of non-family managers, probably due to the unfair redistribution of rents or the presence of a too-strict monitoring system in family firms.

Some studies (Aghion et al., 2013) proposed that factors like product market competition, human capital and firm size appear robustly and positively correlated with decentralization. To our knowledge, this is the first study to test the effect of decentralization on the non-family managers' ratio in family firms. Despite the fact that we cannot clearly identify the direction of causality in this study (do more skilled managers enable decentralized decision making, or are skilled managers attracted to decentralized firms? (Aghion et al., 2013)), we find that decentralization can serve as a way of promoting more inclusive environments (i.e., tighten the relationship) in family

firms. They may use decentralization to promote both agile and fast decision-making, and to evolve into lighter governance models.

Possible limitations of our analysis are related to the cross-sectional nature of EFIGE data. In addition, we do not have information about the number or type of decisions that managers can make in those family firms in our sample. Thus, future research could take it into account and investigate the "depth" of authority delegation inside family firms. Moreover, the use of longitudinal data could also lead to a better understanding of the effects of decentralization on the relationship between non-family managers and the innovation in family firms.

Figure 1: Research model

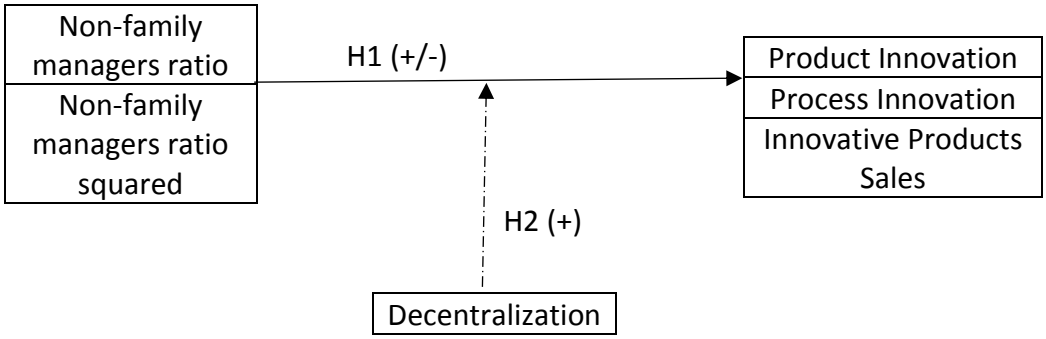


Figure 2: Contrast of Average Marginal Effects of Decentralization on Non-family Managers' Ratio and Product Innovation

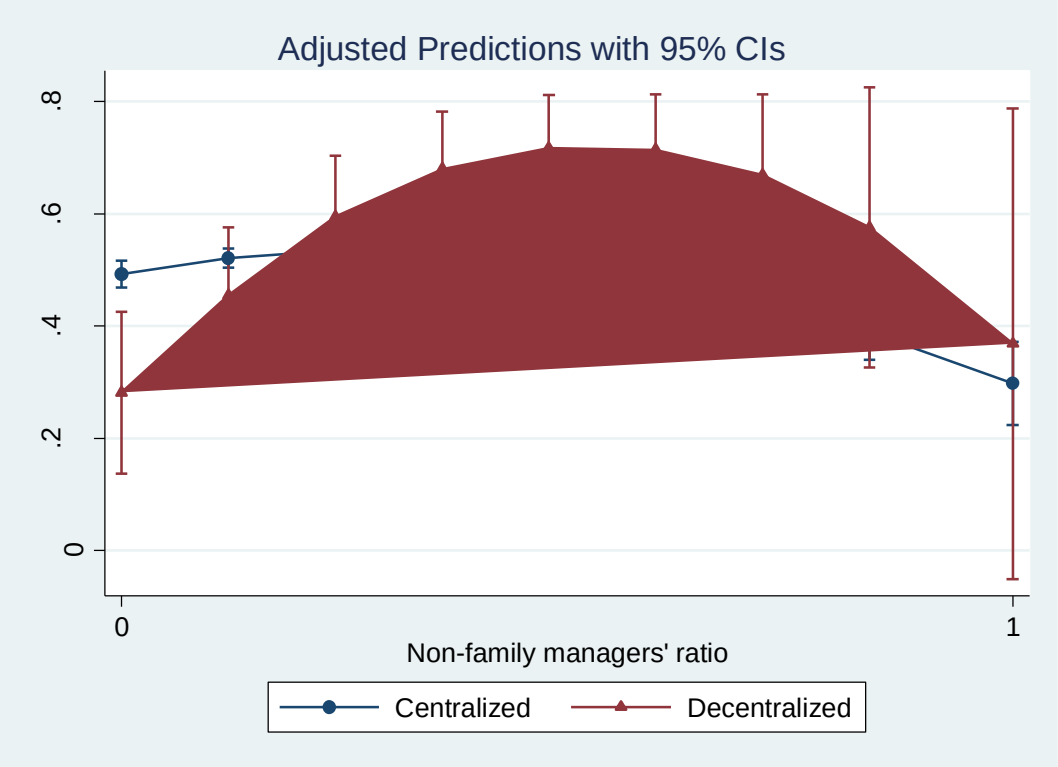


Figure 3: Contrast of Average Marginal Effects of Decentralization on Non-family Managers' Ratio and Process Innovation

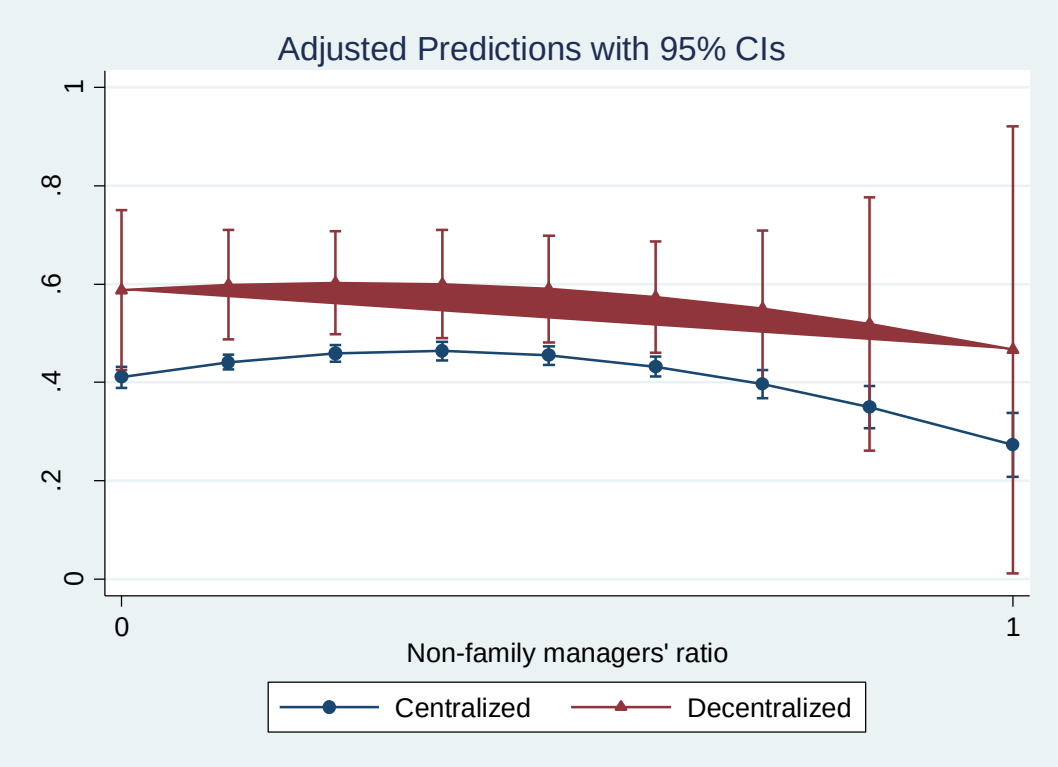


Figure 4: Contrast of Average Marginal Effects of Decentralization on Non-family Managers' Ratio and Innovative Products Sales

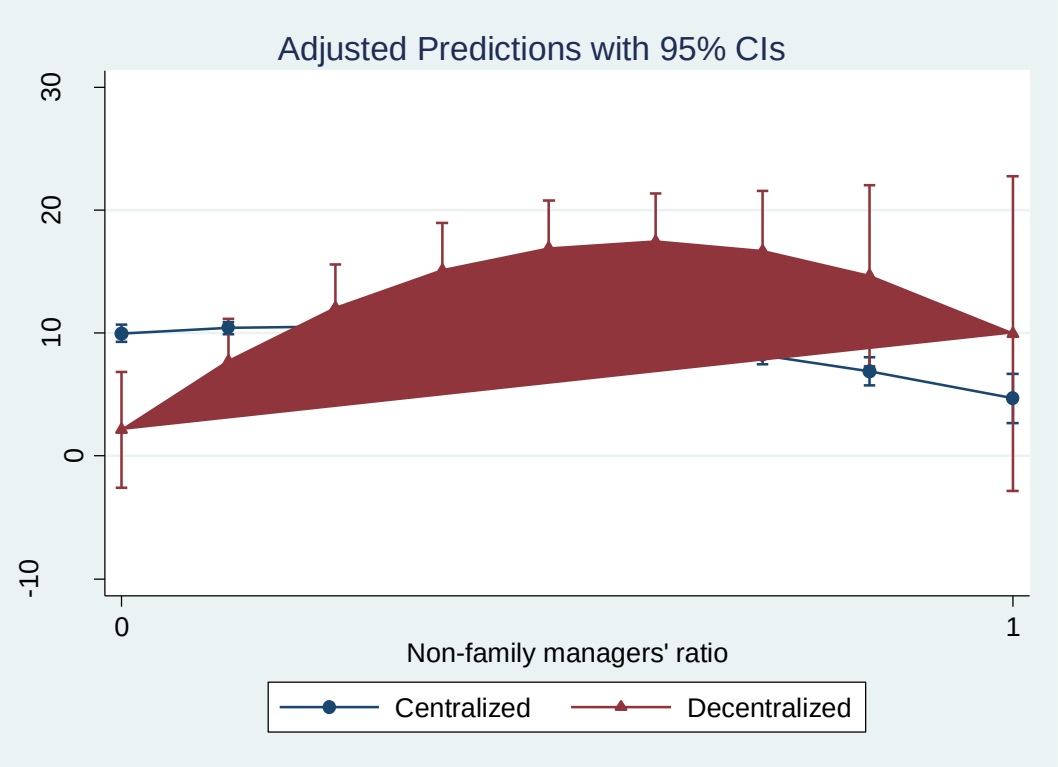


Table 1: Percentile of the 'Non-family managers' ratio'

Number of Non-Family Managers				
Percentiles		**Smallest**		
1%	0	0		
5%	0	0		
10%	0	0		
25%	0	0		
50%	1		**Mean**	4.77
		Largest		
75%	4	450	**SD**	22.77
90%	8	700	**Variance**	518.66
95%	15	800	**Skewness**	20.61
99%	60	900	**Kurtosis**	602.98

Table 2: Descriptive statistics

Variable	Obs.	Mean (SD)	Min	Max
Product innovation	10,365	0.492 (0.5000)	0	1
Process innovation	10,365	0.445 (0.4969)	0	1
Innovative products sales	10,365	9.9036 (18.3300)	0	100
Non-family managers' ratio	9,244	0.449 (0.3754)	0	1
Non-family managers' ratio squared	9,244	0.3424 (0.3626)	0	1
Graduates' ratio	10,357	0.0843 (0.1184)	0	1
Graduates' ratio squared	10,357	0.0211 (0.0742)	0	1
Decentralization	10,365	0.243 (0.4287)	0	1
Family CEO	10,365	0.885 (0.3189)	0	1
Bank debt ratio	10,365	0.393 (0.4700)	0	1
R&D share	10,365	0.035 (0.0714)	0	100
Active abroad	10,365	0.757 (0.4288)	0	1
Competition	10,365	0.501 (0.5000)	0	1
Firm size	10,364	67.259 (228.8582)	10	11,100
Firm age	10,346	36.826 (30.9800)	1	184

Table 3: The Impact of Explanatory Variables on Family Firm's Product and Process Innovation versus Non-Innovators

Variable	Product innovation	Process innovation	Product/Process innovation (b)	No product/process innovation (B)	Δ (b-B)
Non-family managers' ratio	0.4803	0.4765	0.4698	0.4090	0.0608***
Non-family managers' ratio squared	0.3680	0.3656	0.3592	0.3103	0.0488***
Number of non-family managers	6.1509	5.7472	5.5574	3.0565	2.5010***
Graduates' ratio	0.1021	0.0941	0.0957	0.0627	0.0330***
Graduates' ratio squared	0.0275	0.0246	0.0250	0.0137	0.0114***
Number of graduates	9.6824	8.3943	8.4400	4.1466	4.2934***
Decentralization	0.2779	0.2873	0.2723	0.1863	0.0860***
Family CEO	0.8721	0.8657	0.8750	0.9043	-0.0293***
Bank debt ratio	0.4138	0.4460	0.4268	0.3295	0.0973***
R&D share	5.3616	4.7467	4.7261	1.1368	3.5892***
Active abroad	0.8517	0.8186	0.8225	0.6335	0.1891***
Competition	0.5852	0.5556	0.5567	0.3945	0.1622***
Firm size	85.4406	79.3662	77.9841	46.8993	31.0848***
Firm age	38.1147	36.4618[a]	37.1361	36.2443	0.8917

*** p<0.01, ** p<0.05, * p<0.1

[a] Non-significant t-test when compared with family firms that do not implement any process innovation

Table 4: Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Product innovation	1														
Process innovation	0.2525***	1													
Innovative products sales	0.5491***	0.1851***	1												
Non-family managers' ratio	0.0832***	0.0658***	0.0223**	1											
Non-family managers' ratio squared	0.0701***	0.0572***	0.0149	0.9569***	1										
Graduates' ratio	0.1478***	0.0735***	0.1597***	0.1507***	0.1371***	1									
Graduates' ratio squared	0.0851***	0.0414***	0.1182***	0.0980***	0.0963***	0.8763***	1								
Decentralization	0.0809***	0.0933***	0.0440***	0.2070***	0.1852***	0.1008***	0.0685***	1							
Family CEO	-0.0400***	-0.0545***	-0.0116	-0.2846***	-0.3243***	-0.0922***	-0.0627***	-0.1623***	1						
Bank debt ratio	0.0431***	0.1004***	0.0318***	-0.0647***	-0.0693***	0.0049	-0.0149	0.0063	0.0179*	1					
R&D share	0.2583***	0.1578***	0.3377***	0.0649***	0.0595***	0.2438***	0.2091***	0.0611***	-0.0172*	0.0028	1				
Active abroad	0.2168***	0.1280***	0.1515***	0.1243***	0.1139***	0.1108***	0.0427***	0.0879***	-0.0671***	0.0540***	0.1297***	1			
Competition	0.1663***	0.0981***	0.1243***	0.1192***	0.1115***	0.0848***	0.0440***	0.0732***	-0.0706***	-0.0063	0.1112***	0.3271***	1		
Firm size	0.0782***	0.0473***	0.0449***	0.1779***	0.1892***	0.0496***	0.0273***	0.0733***	-0.1139***	-0.0071	0.0360***	0.0741***	0.0694***	1	
Firm age	0.0409***	-0.0105	-0.0374***	0.0667***	0.0615***	-0.0275***	-0.0349***	0.0284***	-0.0169*	-0.0739***	-0.0078	0.0613***	0.0464***	0.1469***	1
VIF	**2.22**	**2.24**	**2.22**	**1.54**	**1.5**	**2.04**	**2.05**	**2.24**	**2.22**	**2.24**	**2.24**	**2.23**	**2.23**	**2.24**	**2.24**

Note: Sector (2 digits of the NACE 2 rev.1 classification) and country dummies omitted to preserve space.
Note: Control variables enter the models in a mean-centered form in line with a recommendation by Dawson (2014)
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimating the Impact of Decentralization on Non-Family Managers' Ratio and Product Innovation in Family Firms

	Model 1		Model 2		Model 3		Model 4	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables								
Non-family managers' ratio			0.0189	0.005	0.577**	0.010	0.520**	0.019
			(0.0731)	(0.0183)	(0.235)	(0.0184)	(0.262)	(0.0187)
Non-family managers' ratio squared					-0.597**	-	-0.677**	-
					(0.240)		(0.273)	
Moderating variable								
Decentralization	0.165***	0.041	0.137**	0.034	0.136**	0.034	-0.251**	0.027
	(0.0522)	(0.0130)	(0.0558)	(0.0139)	(0.0558)	(0.0138)	(0.122)	(0.0213)
Interaction terms								
Non-family managers' ratio* Decentralization							0.923*	-
							(0.540)	
Non-family managers' ratio squared* Decentralization							-0.275	-
							(0.521)	
Control variables								
Family CEO	0.0172	0.004	-0.0504	-0.013	-0.0900	-0.022	-0.0762	-0.019
	(0.0707)	(0.0177)	(0.0786)	(0.0196)	(0.0800)	(0.0199)	(0.0805)	(0.0200)
Bank debt ratio	0.210***	0.053	0.215***	0.054	0.210***	0.052	0.212***	0.053
	(0.0487)	(0.0122)	(0.0519)	(0.0130)	(0.0520)	(0.0130)	(0.0520)	(0.0130)
R&D share	0.109***	0.027	0.109***	0.027	0.109***	0.027	0.109***	0.027
	(0.00870)	(0.0022)	(0.00949)	(0.0024)	(0.00947)	(0.0023)	(0.00950)	(0.0024)
Active abroad	0.653***	0.163	0.702***	0.176	0.698***	0.174	0.700***	0.174
	(0.0559)	(0.0140)	(0.0600)	(0.0150)	(0.0601)	(0.0150)	(0.0601)	(0.0150)
Competition	0.368***	0.092	0.375***	0.094	0.374***	0.093	0.371***	0.092
	(0.0474)	(0.0119)	(0.0504)	(0.0126)	(0.0504)	(0.0126)	(0.0505)	(0.0126)
Firm size[a]	0.228***	0.057	0.220***	0.055	0.221***	0.055	0.219***	0.054
	(0.0266)	(0.0067)	(0.0293)	(0.0073)	(0.0293)	(0.0073)	(0.0293)	(0.0073)
Firm age[a]	0.0162	0.004	0.0113	0.003	0.00851	0.002	0.00777	0.002
	(0.0301)	(0.0075)	(0.0317)	(0.0079)	(0.0318)	(0.0079)	(0.0318)	(0.0079)
Sector dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	
Constant	0.388***		0.441***		0.408***		0.497***	
	(0.0842)		(0.0975)		(0.0988)		(0.123)	
Observations	10,147		9,033		9,033		9,033	
Pseudo/R-squared	0.1294		0.1306		0.1311		0.1324	
Log pseudo-likelihood	-6122.2326		-5443.5648		-5440.4786		-5431.9512	
Percent correctly predicted	68.47%		68.54%		68.15%		68.63%	
Change in fit			-678.6678		-3.0862		-8.5274	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 6: Estimating the Impact of Decentralization on Non-Family Managers' Ratio and Process Innovation in Family Firms

	Model 1		Model 2		Model 3		Model 4	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables								
Non-family managers' ratio			0.0405	0.010	0.246	0.012	0.283	0.011
			(0.0703)	(0.0173)	(0.227)	(0.0176)	(0.254)	(0.0178)
Non-family managers' ratio squared					-0.219	-	-0.248	-
					(0.230)		(0.263)	
Moderating variable								
Decentralization	0.238***	0.059	0.198***	0.049	0.198***	0.049	0.246**	0.045
	(0.0504)	(0.0125)	(0.0537)	(0.0133)	(0.0537)	(0.0134)	(0.115)	(0.0205)
Interaction terms								
Non-family managers' ratio* Decentralization							-0.213	-
							(0.514)	
Non-family managers' ratio squared* Decentralization							0.162	-
							(0.495)	
Control variables								
Family CEO	-0.0709	-0.017	-0.107	-0.027	-0.122	-0.030	-0.122	-0.030
	(0.0674)	(0.0166)	(0.0748)	(0.0185)	(0.0763)	(0.0189)	(0.0767)	(0.0190)
Bank debt ratio	0.314***	0.077	0.305***	0.075	0.303***	0.075	0.303***	0.075
	(0.0474)	(0.0117)	(0.0505)	(0.0125)	(0.0506)	(0.0125)	(0.0506)	(0.0125)
R&D share	0.0480***	0.012	0.0472***	0.012	0.0471***	0.012	0.0471***	0.012
	(0.00469)	(0.0012)	(0.00487)	(0.0012)	(0.00487)	(0.0012)	(0.00487)	(0.0012)
Active abroad	0.365***	0.090	0.356***	0.088	0.354***	0.088	0.354***	0.088
	(0.0543)	(0.0134)	(0.0580)	(0.0143)	(0.0581)	(0.0144)	(0.0581)	(0.0144)
Competition	0.266***	0.066	0.273***	0.067	0.273***	0.067	0.273***	0.068
	(0.0462)	(0.0114)	(0.0489)	(0.0121)	(0.0489)	(0.0121)	(0.0489)	(0.0121)
Firm size[a]	0.271***	0.067	0.251***	0.062	0.252***	0.062	0.252***	0.062
	(0.0259)	(0.0064)	(0.0282)	(0.0070)	(0.0282)	(0.0070)	(0.0282)	(0.0070)
Firm age[a]	-0.112***	-0.028	-0.108***	-0.027	-0.109***	-0.027	-0.109***	-0.027
	(0.0294)	(0.0072)	(0.0310)	(0.0076)	(0.0310)	(0.0077)	(0.0310)	(0.0077)
Sector dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	
Constant	-0.308***		-0.338***		-0.351***		-0.357***	
	(0.0778)		(0.0900)		(0.0909)		(0.0921)	
Observations	10,147		9,033		9,033		9,033	
Pseudo/R-squared	0.0648		0.0641		0.0642		0.0642	
Log pseudo-likelihood	-6517.9098		-5808.3972		-5807.9442		-5807.8294	
Percent correctly predicted	63.42%		63.12%		63.22%		63.17%	
Change in fit			-709.5126		-0.453		-0.1148	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 7: Estimating the Impact of Decentralization on Non-Family Managers' Ratio and Innovative Products Sales in Family Firms

	Model 1	**Model 2**	**Model 3**	**Model 4**
	Coefficients	Coefficients	Coefficients	Coefficients
Independent variables				
Non-family managers' ratio		-0.419	4.101**	2.155
		(0.533)	(1.812)	(1.986)
Non-family managers' ratio squared			-4.827***	-3.570*
			(1.851)	(2.052)
Moderating variable				
Decentralization	0.865**	0.749*	0.731*	-2.513***
	(0.414)	(0.439)	(0.438)	(0.833)
Interaction terms				
Non-family managers' ratio* Decentralization				12.80***
				(4.039)
Non-family managers' ratio squared* Decentralization				-8.899**
				(3.976)
Control variables				
Family CEO	0.269	-0.0625	-0.377	-0.362
	(0.538)	(0.591)	(0.611)	(0.612)
Bank debt ratio	1.003***	1.099***	1.058**	1.059**
	(0.389)	(0.419)	(0.420)	(0.420)
R&D share	0.788***	0.772***	0.771***	0.771***
	(0.0517)	(0.0551)	(0.0550)	(0.0551)
Active abroad	3.120***	3.515***	3.465***	3.482***
	(0.365)	(0.383)	(0.382)	(0.382)
Competition	2.097***	2.054***	2.036***	2.023***
	(0.371)	(0.396)	(0.396)	(0.396)
Firm size[a]	0.279	0.230	0.242	0.229
	(0.202)	(0.213)	(0.213)	(0.214)
Firm age[a]	-1.114***	-1.000***	-1.022***	-1.036***
	(0.234)	(0.246)	(0.246)	(0.246)
Sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Constant	8.343***	8.541***	8.276***	8.684***
	(0.514)	(0.601)	(0.606)	(0.613)
Observations	10,147	9,033	9,033	9,033
Pseudo/R-squared	0.157	0.158	0.159	0.160

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

7. References

Aghion, P., Bloom, N., & Van Reenen, J. (2013). 'Incomplete contracts and the internal organization of firms'. *NBER Working Paper No. 18842*.

Aghion, P., Bloom, N., Lucking, B., Sadun, R., & Van Reenen, J. (2015). 'Growth and Decentralization in Bad Times Preliminary'. *CEP Discussion Paper.*

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.

Altomonte, C., & Aquilante, T. (2012). The EU-EFIGE/Bruegel-Unicredit dataset (No. 2012/13). *Bruegel working paper*.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2003). Founding family ownership and the agency cost of debt. *Journal of Financial Economics*, 68(2), 263–285.

Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family Business Review*, *25*(3), 258–279.

Block, J., & Jaskiewicz, P. (2007). 'The Impact of Non-Family Executives on Firm Value: Conclusions from the Jensen-Meckling Theory of the Firm'. *Available at SSRN: https://ssrn.com/abstract=947047.*

Bloom, N., Genakos, C., Sadun, R., & Van Reenen, J. (2012). 'Management Practices across Firms and Countries'. *Academy of Management Perspectives, 26*, 12–33.

Bloom, N., Sadun, R., & Van Reenen, J. (2010). 'Does product market competition lead firms to decentralize'? *American Economic Review, 100*, 434–438.

Cabrera-Suárez, K., De Saá-Pérez, P., & García-Almeida, D. (2001). 'The succession process from a resource-and knowledge-based view of the family firm'. *Family Business Review, 14*, 37-46.

Carney, M. (2005). Corporate Governance and Competitive Advantage in Family-Controlled Firms. *Entrepreneurship Theory and Practice*, 249–265.

Cater, J. J., Kidwell, R. E., & Camp, K. M. (2016). 'Successor Team Dynamics in Family Firms'. *Family Business Review, 29,* 301–326.

Choi, S. B., Park, B. Il, & Hong, P. (2012). 'Does Ownership Structure Matter for Firm Technological Innovation Performance? The Case of Korean Firms'. *Corporate Governance: An International Review, 20,* 267–288.

Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). 'The ability and willingness paradox in family firm innovation'. *Journal of Product Innovation Management, 32,* 310–318.

Chrisman, J. J., Memili, E., & Kaustav, M. (2013). Nonfamily Managers, Family Firms, and the Winner's Curse: The Influence of Noneconomic Goals and Bounded Rationality. Journal of Small Business Management, 1–25.

Craig, J., & Dibrell, C. (2006). 'The natural environment, innovation, and firm performance: A comparative study'. Family Business Review, 19, 275-288.

Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology, 29*(1), 1–19.

De Massis, A., Frattini, F., Pizzurno, E., & Cassia, L. (2015). 'Product innovation in family versus nonfamily firms: An exploratory analysis'. *Journal of Small Business Management, 53,* 1–36.

De Massis, A., Kotlar, J., Mazzola, P., Minola, T., & Sciascia, S. (2016). 'Conflicting Selves: Family Owners' Multiple Goals and Self-Control Agency Problems in Private Firms'. *Entrepreneurship Theory and Practice*.

De Massis, A., Sieger, P., Chua, J. H., & Vismara, S. (2016). 'Incumbents Attitude toward Intrafamily Succession: An Investigation of Its Antecedents'. *Family Business Review, 29*, 278–300.

Diéguez-Soto, J., Manzaneque, M., & Rojo-Ramírez, A. A. (2016). 'Technological Innovation Inputs, Outputs, and Performance: The Moderating Role of Family Involvement in Management'. *Family Business Review, 29*, 327-346.

Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). 'Doing more with less: Innovation input and output in family firms'. *Academy of Management Journal, 59,* 1224–1264.

Gomez-Mejia, L. R., Cruz, C., Berrone, P., & Castro, J. De. (2011). The Bind that Ties: Socioemotional Wealth Preservation in Family Firms*. The Academy of Management Annals, 5*(1), 653–707.

Gómez-Mejía, L. R., Haynes, K. T., Núñez-Nickel, M., Jacobson, K. J., & Moyano-Fuentes, J. (2007). 'Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills'. *Administrative Science Quarterly, 52,* 106-137.

Haans, R. F. J., Pieters, C., & He, Z.-L. (2016). Thinking About U: Theorizing and Testing U- and Inverted U-Shaped Relationships in Strategy Research. *Strategic Management Journal, 37,* 1177–1195.

Hagedoorn, J., & Cloodt, M. (2003). Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy, 32*(8), 1365–1379.

Hitt, M. A., Hoskisson, R. E., Johnson, R. A., & Moesel, D. D. (1996). The Market for Corporate Control and Firm Innovation. *The Academy of Management Journal, 39*(5), 1084–1119.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3,* 305-360.

Kammerlander, N., Dessì, C., Bird, M., Floris, M., & Murru, A. (2015). 'The Impact of Shared Stories on Family Firm Innovation'. *Family Business Review, 28,* 332.

Kammerlander, N., van Essen, M. (2017). *'Research: Family Firms Are More Innovative Than Other Companies'.* Boston, MA: Harvard Business School Publishing.

Kanter, R. M. (1982). 'The middle managers as innovator'. *Harvard Business Review*, *60,* 95–106.

Karra, N., Tracey, P., & Phillips, N. (2006). Altruism and agency in the family firm: Exploring the role of family, kinship, and ethnicity. *Entrepreneurship Theory and Practice, 30,* 861-877.

Klein, S., & Bell, F. (2007). 'Non-family executives in family businesses: A literature review'. *Journal of Family Business Studies, 1,* 19–37.

König, A., Kammerlander, N., & Enders, A. (2013). 'The Family Innovator's Dilemma: How Family Influence Affects the Adoption of Discontinuous Technologies by Incumbent Firms'. *Academy of Management Review, 38,* 418–441.

Kraus, S., Pohjola, M., & Koponen, A. (2012). 'Innovation in family firms: An empirical analysis linking organizational and managerial innovation to corporate successes. *Review of Managerial S*cience*, 6,* 265–286.

Llach, J., & Nordqvist, M. (2010). 'Innovation in family and non-family businesses: A resource perspective'. *International Journal of Entrepreneurial Venturing, 2,* 381-399.

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2015). 'The impact of family ownership, management, and governance on innovation'. *Journal of Product Innovation Management, 32,* 319–333.

Meier, O., & Schier, G. (2016). The early succession stage of a family firm: exploring the role of agency rationales and stewardship attitudes. Family Business Review, 29(3), 256–277.

Miller, D., Breton-Miller, I. Le, Corbetta, G., & Pittino, D. (2014). 'When do Non- Family CEOs Outperform in Family Firms'? Agency and Behavioural Agency Perspectives. *Journal of Management Studies, 51,* 547–572.

Minichilli, A., Corbetta, G., & MacMillan, I. C. (2010). 'Top Management Teams in Family-Controlled Companies: Familiness, Faultlines, and Their Impact on Financial Performance'. *Journal of Management Studies, 47,* 205–222.

Naldi, L., Nordqvist, M., Sjöberg, K., & Wiklund, J. (2007). 'Entrepreneurial orientation, risk taking, and performance in family firms'. *Family Business Review, 20,* 33-47.

OECD (Organization for Economic Cooperation and Development)/Eurostat 2005. *Guidelines for Collecting and Interpreting Innovation Data* — The Oslo Manual, 3rd Edition. Paris: OECD.

Peng, M. W., & Jiang, Y. (2010). 'Institutions behind family ownership and control in large firms'. *Journal of Management Studies, 47,* 253–273.

Roessl, D., Fink, M., & Kraus, S. (2010). 'Are family firms fit for innovation? Towards an agenda for empirical research'. *International Journal of Entrepreneurial Venturing, 2,* 366.

Schulze, W. S., Lubatkin, M. H., & Dino, R. N. (2003). 'Exploring the agency consequences of ownership dispersion among the directors of private family firms'. *Academy of Management Journal, 46,* 179–194.

Spriggs, M., Yu, A., Deeds, D., & Sorenson, R. L. (2012). 'Too Many Cooks in the Kitchen: Innovative Capacity, Collaborative Network Orientation, and Performance in Small Family Businesses'. *Family Business Review, 26,* 32–50.

Teece, D. J., Pisano, G. P., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509–533.

Villalonga, B., & Amit, R. (2006). 'How do family ownership, control and management affect firm value'? *Journal of Financial Economics, 80,* 385–417.

Zahra, S. A. (2005). 'Entrepreneurial risk taking in family firms'. *Family Business Review, 18,* 23-40.

8. Appendix

Table 8: Testing Robustness of the Impact of Decentralization on Non-Family Managers' Ratio and Product Innovation in Family Firms

	Model 1 SME		**Model 2** Large		**Model 3** Scaling by Ln(Number of employees)		**Model 4** Ln(All managers – family managers)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables								
Non-family managers' ratio	0.652**	0.052	1.884	-0.114	2.851***	0.114	0.0701	0.033
	(0.266)	(0.0186)	(1.906)	(0.1353)	(0.755)	(0.0647)	(0.0702)	(0.0096)
Non-family managers' ratio squared	-0.703**	-	-1.878	-	-11.59***	-	-0.00411	-
	(0.280)		(1.733)		(2.481)		(0.0223)	
Moderating variable								
Decentralization	-0.212*	0.033	-0.860	0.003	-0.908**	0.111	-0.230**	0.034
	(0.124)	(0.0218)	(0.785)	(0.0662)	(0.377)	(0.0625)	(0.109)	(0.0153)
Interaction terms								
Non-family managers' ratio*	0.891	-	1.376	-	14.23***	-	0.455***	-
Decentralization	(0.553)		(3.042)		(4.933)		(0.127)	
Non-family managers' ratio squared*	-0.213	-	-0.293	-	-27.06*	-	-0.0837**	-
Decentralization	(0.539)		(2.576)		(14.87)		(0.0335)	
Control variables								
Family CEO	-0.127	-0.032	-0.0114	-0.002	-1.856***	-0.461	-0.0240	-0.006
	(0.0838)	(0.0209)	(0.290)	(0.0569)	(0.244)	(0.0606)	(0.0774)	(0.0193)
Bank debt ratio	0.256***	0.064	-0.347	-0.068	0.595***	0.148	0.213***	0.053
	(0.0528)	(0.0132)	(0.278)	(0.0542)	(0.172)	(0.0427)	(0.0520)	(0.0130)
R&D share	0.115***	0.029	0.0416*	0.008	0.360***	0.089	0.109***	0.027
	(0.0102)	(0.0025)	(0.0235)	(0.0046)	(0.0321)	(0.0079)	(0.00949)	(0.0024)
Active abroad	0.720***	0.180	1.287***	0.253	1.843***	0.457	0.695***	0.174
	(0.0607)	(0.0152)	(0.429)	(0.0891)	(0.188)	(0.0466)	(0.0601)	(0.0150)
Competition	0.388***	0.097	0.320	0.063	1.198***	0.297	0.369***	0.092
	(0.0513)	(0.0128)	(0.267)	(0.0523)	(0.166)	(0.0413)	(0.0505)	(0.0126)
Firm size[a]	-	-	-	-	-	-	0.171***	0.043
							(0.0362)	(0.0090)
Firm age[a]	0.0378	0.009	0.113	0.022	-0.506***	-0.126	0.0105	0.003
	(0.0323)	(0.0081)	(0.141)	(0.0277)	(0.0937)	(0.0233)	(0.0318)	(0.0079)
Sector dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	
Constant	0.479***		-0.212		0.421***		0.381***	
	(0.101)		(0.550)		(0.132)		(0.0993)	
Observations	8,579		455		9,034		9,033	
Pseudo/R-squared	0.1282		0.1278		0.1214		0.1325	
Log pseudo-likelihood	-5181.7831		-251.58127		-5501.7176		-5431.3065	
Percent correctly predicted	68.46%		71.65%		67.87%		68.46%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 9: Testing Robustness of the Impact of Decentralization on Non-Family Managers' Ratio and Process Innovation in Family Firms

	Model 1 SME		**Model 2** Large		**Model 3** Scaling by Ln(Number of employees)		**Model 4** Ln(All managers – family managers)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Independent variables								
Non-family managers' ratio	0.494*	0.049	-0.163	0.205	3.098***	0.079	0.0804	0.016
	(0.257)	(0.0177)	(1.674)	(0.1785)	(0.727)	(0.0630)	(0.0665)	(0.0092)
Non-family managers' ratio squared	-0.333	-	0.322	-	-10.97***	-	-0.00848	-
	(0.268)		(1.595)		(2.346)		(0.0202)	
Moderating variable								
Decentralization	0.286**	0.064	-0.108	-0.018	0.717**	0.140	0.189*	0.059
	(0.116)	(0.0210)	(0.772)	(0.0819)	(0.356)	(0.0611)	(0.104)	(0.0146)
Interaction terms								
Non-family managers' ratio* Decentralization	-0.0983	-	-1.120	-	-1.923	-	0.0948	-
	(0.526)		(2.878)		(4.815)		(0.125)	
Non-family managers' ratio squared* Decentralization	0.0659	-	1.541	-	5.344	-	-0.0471	-
	(0.512)		(2.453)		(14.80)		(0.0327)	
Control variables								
Family CEO	-0.147*	-0.036	-0.345	-0.086	-1.411***	-0.352	-0.108	-0.027
	(0.0810)	(0.0201)	(0.286)	(0.0714)	(0.232)	(0.0578)	(0.0737)	(0.0182)
Bank debt ratio	0.340***	0.084	-0.118	-0.029	0.944***	0.235	0.301***	0.074
	(0.0514)	(0.0127)	(0.262)	(0.0655)	(0.167)	(0.0416)	(0.0506)	(0.0125)
R&D share	0.0516***	0.013	0.00293	0.001	0.153***	0.038	0.0470***	0.012
	(0.00536)	(0.0013)	(0.0119)	(0.0030)	(0.0163)	(0.0041)	(0.00488)	(0.0012)
Active abroad	0.372***	0.092	2.000***	0.500	0.790***	0.197	0.348***	0.086
	(0.0581)	(0.0143)	(0.529)	(0.1326)	(0.181)	(0.0450)	(0.0581)	(0.0144)
Competition	0.304***	0.075	-0.161	-0.040	0.805***	0.201	0.273***	0.067
	(0.0499)	(0.0123)	(0.250)	(0.0624)	(0.162)	(0.0403)	(0.0490)	(0.0121)
Firm size[a]	-	-	-	-	-	-	0.247***	0.061
							(0.0344)	(0.0085)
Firm age[a]	-0.0652**	-0.016	-0.0311	-0.008	-0.716***	-0.178	-0.107***	-0.027
	(0.0315)	(0.0078)	(0.139)	(0.0347)	(0.0915)	(0.0228)	(0.0310)	(0.0077)
Sector dummies	Yes		Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes		Yes	
Constant	-0.335***		-0.588		0.109		-0.382***	
	(0.0940)		(0.464)		(0.126)		(0.0918)	
Observations	8,579		455		9,034		9,033	
Pseudo/R-squared	0.0584		0.1479		0.0598		0.0648	
Log pseudo-likelihood	-5540.9737		-267.58511		-5835.5115		-5804.1537	
Percent correctly predicted	62.92%		68.57%		62.53%		63.04%	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 10: Testing Robustness of the Impact of Decentralization on Non-Family Managers' Ratio and Innovative Products Sales in Family Firms

	Model 1 SME	**Model 2** Large	**Model 3** Scaling by Ln(Number of employees)	**Model 4** Ln(All managers – family managers)
	Coefficients	Coefficients	Coefficients	Coefficients
Independent variables				
Non-family managers' ratio	2.287 (1.994)	12.25 (13.05)	11.51** (5.271)	-0.235 (0.571)
Non-family managers' ratio squared	-3.903* (2.065)	-8.704 (13.09)	-58.09*** (15.71)	0.226 (0.191)
Moderating variable				
Decentralization	-2.459*** (0.846)	-2.022 (3.243)	-7.868*** (2.523)	-1.016 (0.781)
Interaction terms				
Non-family managers' ratio* Decentralization	14.33*** (4.164)	-8.042 (15.74)	113.3*** (35.38)	2.483*** (0.931)
Non-family managers' ratio squared* Decentralization	-10.55** (4.139)	12.29 (15.47)	-196.0* (105.3)	-0.556** (0.250)
Control variables				
Family CEO	-0.294 (0.631)	-0.316 (2.528)	-3.283* (1.779)	0.228 (0.577)
Bank debt ratio	1.181*** (0.428)	-0.964 (1.946)	3.415** (1.383)	1.103*** (0.420)
R&D share	0.784*** (0.0596)	0.630*** (0.117)	2.509*** (0.176)	0.767*** (0.0554)
Active abroad	3.482*** (0.387)	4.257** (1.944)	9.613*** (1.224)	3.485*** (0.383)
Competition	2.081*** (0.403)	0.0240 (1.698)	6.315*** (1.293)	2.024*** (0.396)
Firm size[a]	-	-	-	-0.212 (0.261)
Firm age[a]	-1.099*** (0.251)	-0.450 (0.862)	-4.002*** (0.716)	-0.991*** (0.246)
Sector dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Constant	9.104*** (0.637)	1.103 (2.765)	7.198*** (0.914)	8.092*** (0.608)
Observations	8,579	455	9,034	9,033
Pseudo/R-squared	0.160	0.247	0.157	0.159

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 11: Endogeneity Test for the Variable Non-family managers' ratio (IV: Graduates' ratio)

	Product innovation		Process innovation		Innovative products sales
	Model 1		Model 2		Model 3
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients
Independent variables					
Graduates' ratio	15.55***	3.887	5.878***	1.449	97.27***
	(1.880)	(0.4699)	(1.764)	(0.4348)	(13.90)
Graduates' ratio squared	-15.77***	-3.943	-7.150***	-1.763	-81.14***
	(2.944)	(0.7360)	(2.693)	(0.6639)	(20.82)
Moderating variable					
Decentralization	0.0572	0.014	0.266***	0.066	-0.851
	(0.106)	(0.0265)	(0.0959)	(0.0236)	(0.746)
Control variables					
Family CEO	-0.838*	-0.209	-0.715	-0.176	-0.331
	(0.492)	(0.1230)	(0.441)	(0.1087)	(3.379)
Bank debt ratio	0.0817	0.020	0.252***	0.062	0.352
	(0.0562)	(0.0140)	(0.0530)	(0.0131)	(0.424)
R&D share	0.104***	0.026	0.0475***	0.012	0.746***
	(0.00533)	(0.0013)	(0.00393)	(0.0010)	(0.0270)
Active abroad	0.463***	0.116	0.322***	0.079	1.399***
	(0.0699)	(0.0175)	(0.0658)	(0.0162)	(0.515)
Competition	0.309***	0.077	0.248***	0.061	1.574***
	(0.0486)	(0.0121)	(0.0470)	(0.0116)	(0.376)
Firm size[a]	0.183	0.046	0.381**	0.094	-1.966
	(0.176)	(0.0440)	(0.157)	(0.0387)	(1.203)
Firm age[a]	-0.0459	-0.011	-0.161***	-0.040	-1.100***
	(0.0494)	(0.0123)	(0.0456)	(0.0112)	(0.355)
Sector dummies	Yes		Yes		Yes
Country dummies	Yes		Yes		Yes
Constant	-0.847		-0.215		-7.040
	(0.660)		(0.589)		(4.531)
Observations	10,140		10,140		10,140
Pseudo/R-squared	0.1353		0.0654		0.162
Log pseudo-likelihood	-6076.3565		-6509.3659		-
Percent correctly predicted	68.90%		63.40%		-
Chi-square	43.86*		0.28		0.04

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[a] Firm size and firm age enter our models in a log-linear form due to their skewed distributions

Table 12: Description of the Variables

Variable	Description
Product innovation	Dummy for family firms that carried out any product innovation in years 2007-09
Process innovation	Dummy for family firms that carried out any process innovation in years 2007-09
Innovative products sales	The average percentage of turnover from innovative products sales for family firms.
Non-family managers' ratio	Ratio of a number of non-family managers' on a total number of managers in a given family firm. It can take values between 0 and 1.
Graduates' ratio	The proportion of university graduates on a total personnel in a family firm. It can take values between 0 and 1.
Decentralization	Dummy for decentralized management: managers can take autonomous decisions in some business areas.
Family CEO	Dummy for family CEO: the CEO is the individual who controls the firm or a member of the controlling family
Bank debt ratio	A family firm's share of bank debt over the total external financing. It can take values between 0 and 1.
R&D share	A family firm's R&D expenses as percentage of the firm total turnover in 2008. It can take values between 0 and 100.
Active abroad	Dummy if a family firm is active abroad, and these activities can include exports or imports (either nearby or to a global market), or when a firm reports having a production activity contracts and agreements abroad, or when a firm is running at least part of its production activity in another country via direct investments.
Competition	Dummy for competition from abroad: the firm has competitors abroad
Firm size	Logarithm of the total number of employees in a family firm in a respective home country in 2008.
Firm age	Logarithm of the number of years a family firm operates in a respective market.
Sector	Dummies for sectors according to 2 digits of the NACE 2 rev.1 classification.
Country	Dummies for countries included in the sample (Austria, France, Germany, Hungary, Italy, Spain and the UK)

Essay 3: Family Involvement and Innovation: The Capabilities' Paradox

Abstract

Many scholars argue that a family firm's innovation depends on the controlling family's ability and willingness to act towards innovation. This study analyzes how the balance between ability and willingness varies when we consider family and non-family firms. For this purpose, we use a sample of Spanish manufacturing firms for years from 1991 to 2011. Our results show that a higher family involvement significantly weakens the positive link between a firm's capability to transfer and adopt knowledge (a general-purpose capability) and product innovation. Contrary to what we could expect, we also find that family involvement strengthens the positive link between the technological capability (a market-specific capability) and product innovation. We conclude that the balance between a family firm's ability and its willingness to innovate is affected by the family owners' unwillingness to use those innovation capabilities which directly depend on the outsiders' ability and not otherwise. Hence, we show that the source of the "innovation paradox" in a family firm is a combination of its ability and the mistrust in outsiders' ability as perceived by the controlling family.

Keywords

Capabilities; Family involvement; Product and process innovation

1. Introduction

Previous scholarly research has theorized that family firms have the ability yet lower willingness to engage in technological innovation (Carney, 2005; Chrisman, Chua, De Massis, Frattini, & Wright, 2015). More specifically, Chrisman et al. (2015) claim that family firms have the "discretion" but not a "disposition to act" innovatively. One traditional explanation is that family firms' affective considerations – their socioemotional wealth (SEW) – are often as important as economic considerations (Berrone, Cruz, & Gomez-Mejia, 2012). That is, family firms tend to favor strategic actions that preserve the family's control over economic profits, at the expense of promising innovations (Kotlar, De Massis, Frattini, Bianchi, & Fang, 2013). Family business literature has given some explanations of this unwillingness, including risk aversion, or the hiring of family members over skilled professionals, etc. (Fang, Memili, Chrisman, & Penney, 2016; Minichilli, Corbetta, & MacMillan, 2010). Nevertheless, family firms controlled by the third generation family members have been found to "simultaneously engage in multiple levels of innovation" (Sharma, Blunden, Labaki, Michael-Tsabari, & River Algarin, 2013). Hence, family firms may experience greater or lesser level of "the ability and willingness" paradox (Chrisman et al., 2015). Thus, we ask, in what circumstances family firms can experience this innovation paradox, and how does the balance between "the ability and the willingness" vary in the case of family and non-family firms?

To answer these questions, we use the dynamic capabilities framework developed by Teece, Pisano and Shuen (1997), which has been further examined by Pisano (2016). More precisely, Pisano (2016) claims that firms possess a continuum of capabilities that span from a highly "general-purpose" (like operational effectiveness) to highly "market-specific" (like vehicle design, diagnosis of mental health problems, etc.). He also argued that an optimal firm's capability strategy is determined by the degree to which both types can become either complements or substitutes. In this line, he shows that the strategic value of "general-purpose" capabilities has been underestimated, so far, in the strategy literature (Pisano, 2016).

Family firms also possess a continuum of the "general-purpose" and "market-specific" capabilities that enhance their product and process innovation. For example, Miller and Le Breton-Miller (2006) claim that the positive governance choices in family

firms, in terms of their commitment, can help build and sustain necessary innovation capabilities. More precisely, they point out the importance of factors like the long-term tenure, learning and farsighted investment in family firm innovation. In addition, Lee and Kelley (2008) show that the prominent capability that an organization can maintain for innovation is "the ability to learn and improvise." Knowing all this, we have assessed different types of a firm's general-purpose and market-specific innovative capabilities to analyze how "the ability and willingness" paradox impacts the innovate outcomes in family controlled firms as compared to non-family firms. These capabilities are: (1) the capability to transfer and adopt knowledge, which as a "general-purpose" capability can be "deployed in a relatively broad range of uses and markets"; and (2) the technological capability, that as a "market-specific" capability captures "a degree to which knowledge is transferable across organizational tasks or contexts" (Pisano, 2016). Both have been shown to positively impact a firm's innovation (Alegre & Chiva, 2008; Dosi, Faillo, & Marengo, 2008; García, Avella, & Fernández, 2012; Smith, Collins, & Clark, 2005; Szulanski, Ringov, & Jensen, 2016). We also show that firms that sustain those capabilities at the same time can achieve higher innovative outcomes than other firms. And this underlines the importance of owners and managers' choice concerning the formation and maintenance of firm's capabilities and their impact on firm's success.

For the purpose of this study, we use a sample of Spanish manufacturing firms for the period from 1991 to 2011 collected within the Survey on Business Strategies (Encuesta sobre Estrategias Empresariales) conducted by the National Bureau of Industrial Activity Foundation (Fundación SEPI) with the support of the Spanish Ministry of Industry. Our results reveal that the positive link between a firm's capability to transfer and adopt knowledge and innovation (i.e., product innovation, process innovation and number of product innovations) weakens with an increasing family involvement. However, we do not find the same result in terms of a family firm's technological capability and innovation. In fact, there we find that this positive link with product innovation is further strengthened at a higher level of family involvement.

Undoubtedly, family firm-specific governance and the organizational processes affect firm's capabilities and technological innovation (Kotlar et al., 2013). Scholars have theorized that those processes can cause a family firm not to achieve desired innovative outcomes, despite having an ability to do so. On the one hand, investing in innovation

capabilities may create a threat to SEW dimensions like family firm's control, identification of family members with a firm, or emotional attachment (Berrone et al., 2012). On the other hand, a successful innovation increases the odds that a family firm will survive over generations, which positively affects another SEW dimension that relates to renewal of family bonds through dynastic succession. This study extends, beyond the SEW preservation argument, the understanding of "the ability and willingness paradox" in a family firm's innovation. We show that the balance between ability and willingness to innovate in family firms is a combination between their ability, and also a controlling family's assessment on the superiority of this ability. That is, hiring a greater proportion of highly skilled employees (which also indicates that family owners are less loss-averse towards their SEW), does not necessarily lead to their higher willingness to innovate. The lack of trust in the superiority of this ability significantly harms a family firm's innovative outcomes. Beyond its academic contribution, our conclusions also inform family business practitioners about this circumstance of "mistrust" which triggers a family firm's unwillingness to innovate.

The remainder of the paper is structured as follows. Section 2 develops a theoretical framework of analysis. Section 3 describes the data and section 4 shows the results. Section 5 discusses the findings, and section 6 offers conclusions.

2. Literature Review

2.1. Family Involvement and Innovation

Family ownership, along with the active involvement of several family members in a company through equity capital, management or control are the attributes of a family firm in our approach (Klein & Bell, 2007; Spriggs, Yu, Deeds, & Sorenson, 2012). Based on the agency theory view, some authors have argued that family firms are risk-averse and reluctant to invest in new ventures (Cabrera-Suárez et al., 2001; Naldi et al., 2007). In addition to this view, and using a SEW perspective, it has been shown that non-pecuniary goals, which can drive family owners' behavior, and the type of decision-making present in family firms, can diminish family firms' investment in innovation (Gomez-Mejia, Takács Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007). This branch of research has led some to the conclude that family influence can diminish a firm's innovation input (Matzler, Veider, Hautz, & Stadler, 2015). More specifically, these

authors consider that while agency theory is able to explain why families are reluctant to invest in innovation, it cannot explain why family firms are less willing to invest in innovation but they are more capable, at the same time, of achieving desirable innovation outcomes.

However, despite their problems with risk and the loss of control, many family firms engage in innovation-labeled initiatives, making a colossal effort to deliver quality results. Thus, to breach this gap, some authors have suggested that families may have particular capabilities that enable them to be more effective in their innovation efforts than non-family firms, and it may be that their innovative output becomes larger (Duran, Kammerlander, van Essen, & Zellweger, 2016; Matzler et al., 2015). A possible explanation comes from the resource-based perspective, which shows how the specific knowledge, capabilities and social and relational capital of family members will have a positive impact on the innovation output of the firm (Llach & Nordqvist, 2010). The existence of unique resources and capabilities of family members would provide a more effective use of the innovation input, allowing family firms to be more efficient in their innovation investments.

Other authors distinguish between ability and willingness (Chrisman et al., 2015), as the two key drivers of family firms that theoretically cause the differences in behavior and performance between family and non-family firms, and also among family firms. More specifically, they posit that family firms, due to the virtually unfettered discretion of family owners and the involvement of family managers, have superior ability to innovate in comparison to nonfamily firms. Nevertheless, and due to the presence of noneconomic goals, family owners may be more willing to follow strategies that are less innovative (and less risky). Precisely, as an innovation "entails significant risk, requires a strong commitment of resources, and takes time to produce tangible outcomes" some family firms may view it as a threat to their SEW endowment (not seeing it as a benefit, but rather as a cost to their socioemotional wealth) (Berrone et al., 2012). Nevertheless, there are reasons to believe that family owners, in their strategic decisions, will be also impacted by their long-term goal of a renewal of family bonds through succession (which also increases their SEW). Hence, they will be willing to engage in strategic actions which like innovation can secure their firm's future growth.

To extend our understanding of "the ability and willingness" paradox of a family firm innovation, we analyze how the level of family involvement determines those decisions that family firms take in relation to their innovation capabilities (the capability identification, selection, and formation), and how it effects on a family firm's innovation.

2.2. Family Involvement, Capabilities and Innovation

Family business scholars have attempted to better understand how family firms can utilize the advantages of family involvement and create multigenerational success (Habbershon & Williams, 1999). In this vein, "familiness" as an important part of family firm's resource portfolio (Hatak, Kautonen, Fink, & Kansikas, 2016) has been shown to determine the strategic behavior of family firms (Chrisman et al., 2015; Habbershon & Williams, 1999), and also their attitude towards innovation (Carney, 2005).

To tackle the issue of a firm-level capability's differences, Teece et al. (1997) have developed the dynamic capabilities framework. They showed that firm-level differences in capabilities relate to a specific firm: "assets", "processes" and "paths" (Teece, Pisano, & Shuen, 1997). Accordingly, they defined "assets" as a firm's crucial resource like knowledge, technical skills, or organizational competences; the "processes" as a firm's ability to restructure (or reconfigure) their assets by its governance mechanism and management; and finally, the "paths" as a firm's "commitment" to the chosen series of (repeatable) routines to achieve a competitive advantage (Pisano, 2016; Teece et al., 1997). These authors have also highlighted that some organizations pioneer in terms of creating, maintaining and renewing those critical skills and competences which lead to their sustained competitive advantage. To uncover the circumstance of a family firm's "innovation paradox", we develop a simple framework that focuses on those "assets" and "processes" which shape a firm's innovation "paths."

Previous scholarly research has shown that the following types of innovative capabilities play a crucial role in shaping firm's innovation: (1) the capability to adopt and transfer knowledge (Alegre & Chiva, 2008; Dosi et al., 2008; Smith et al., 2005; Szulanski, 2000); and (2) the technological capability (García et al., 2012; Zahra & George, 2002). In relation to a firm's capability to transfer and adopt knowledge, some authors argued that those organizations which lack the expertise in the management of knowledge transfer fail to realize their potential (Szulanski et al., 2016), and that those

which possess it have a superior ability to develop or adopt the cutting edge innovations. In relation to a firm's technological capability, it reflects a firm's preference to invest in R&D activities to develop innovation within a firm. Firms engaging in R&D internally show better understanding of "others' discoveries" (García et al., 2012). This complementarity between internal R&D and external knowledge acquisition, however, has been shown to be context-specific (Cassiman & Veugelers, 2006).

Nevertheless, those two types of capabilities co-exist in firms, and it is up to firm's owners and managers' strategic choice to decide how they allocate both of them to shape firm's innovation. A firm's capability to transfer and adopt knowledge is a rather "general-purpose" capability, whereas the technological capability can be viewed as a rather "market-specific" capability (Pisano, 2016). More precisely, a general (not generic) organizational knowledge transfer or adoption enhances a firm's adaptability and can serve in various markets. However, a firm's technological capability is tightly connected to the specific organizational knowledge, and it can serve in a context of a specific tasks or project.

Both family firms and non-family firms can create and maintain a range of innovative capabilities (from general-purpose to market-specific) as described above. However, family firms have been shown to achieve differing innovative outcomes than non-family firms due to family involvement. Family firms are characterized by distinctive "processes." Those "processes" are determined by the controlling family's impact on the family business. Similarly to Teece et al. (1997), we argue that family firms, due to family involvement, engage in firm's "processes" which ultimately lead them to "paths" different from those of non-family owned firms. Family involvement shapes a family firm's "processes" in such a way that it can trigger the unwillingness of the controlling family to engage in innovation. One reason for this circumstance could be the presence of a myopic loss aversion within a family firm (Chrisman & Patel, 2012). A concern for current control and a performance that exceeds aspirations results in a family firm's unwillingness to promote innovation within family firms. Thus, we hypothesize:

H1. The relationship between the "capability to transfer and adopt knowledge" and family firm's innovation is moderated by the degree of family involvement. That is, a high family involvement diminishes a positive link between the "capability to transfer and adopt knowledge" and family firm's innovation.

H2. The relationship between the "technological capability" and family firm's innovation is moderated by the degree of family involvement. That is, a high family involvement diminishes a positive link between the "technological capability" and family firm's innovation.

Insert Figure 1 about here

3. Data

To test our hypotheses, we use the data from the Survey on Business Strategies (Encuesta sobre Estrategias Empresariales – the ESEE). The ESEE data is a representative sample (by size and industry) of the population of manufacturing firms in Spain. The survey is conducted on a yearly basis by the National Bureau of Industrial Activity Foundation (Fundación SEPI), and the Spanish Ministry of Industry supports this project. In the initial survey year (1990) the ESEE included information on 2188 firm (García et al., 2012). We have collected the ESEE data from 1991 to 2011. Throughout those years some firms have quitted from the ESEE survey for various reasons, and other newly created Spanish firms have been included. However, a representative sample of newly created firms in Spain from 1991 onwards has been included in the ESEE on a yearly basis (García et al., 2012). Therefore, due to these dynamics, our initial sample consists of an unbalanced panel of 3,365 firms and 32,989 firm-year observations from 1991 to 2011.

Table 1 presents the industry breakdown and some descriptive statistics for the all firms in our final sample. Product innovation occurs on average in 22.92 percent of the firm-years, whereas the average number of product innovations implemented by the firms from our sample equals to 2.21. Process innovation seems to be a preferred type of innovation in the Spanish manufacturing firms. It occurs more frequently than product innovation, and on average in 32.70 percent of the firm-years. Only in 3 industries (i.e., "leather, fur and footwear", "computer products, electronics and optical" and "furniture") out of 20 as shown in the table 1, Spanish firms report more innovation, on average, in products than processes. In addition, those Spanish firms which belong to the "leather, fur and footwear" industry have also reported the highest average number of product innovations, and the smallest number of employees of the

firm-year observations. The largest number of employees in Spanish manufacturing firms tend to belong to the "vehicles and accessories" industry.

Insert Table 1 about here

Dependent variables

This study focuses on family firm's ability and willingness to innovate. To measure a firm's product innovation we use two different measures in our models. First, we use a binary variable which indicates whether a company has achieved product innovation during the financial year. Second, we apply a dependent variable that measures a number of product innovations achieved at time *t*. This variable can take values between 0, if a firm reports no product innovations, and 650 if a firm reports the maximum of product innovations in our sample. Finally, we also use a binary dependent variable that indicates whether a firm has achieved process innovation during the financial year.[6]

Independent variables

We include some measures of firms' innovative capabilities in our models to uncover "the ability and willingness" paradox in family firm innovation. In particular, we consider: (1) the capability to transfer and adopt knowledge (measured by the relative proportion of engineers and graduates over the total personnel of the company); (2) the technological capability (measured by its relative R&D expenditures). To distinguish between more and less capable firms, we use the relative measures of firm's capabilities as compared to a specific industry average. That is, we compare a focal firm's capabilities measured by its relative level to the industry. More precisely, we subtract the average of each capability for industry *j* at time *t* from the specific capability of firm *i* from industry *j* at time *t*. Those relative measures indicate the firm's standing as compared to the average firm within the same industry in Spain. Based on this, we have built two dummies for both types of capabilities (i.e., one for the capability to transfer and adopt knowledge; and another one for the technological capability), which capture a given capability's intensity compared to the industry average. That is, the dummy takes value 1 if the relative measure has a positive (or zero) value, indicating that the firm is a

[6] The ESEE data does not provide information about the number of achieved process innovations.

forerunner in its industry, whereas it takes a value 0 if its relative measure has a negative value indicating that this firm is a foot-dragger in its industry.

Despite the fact that similar measurement of the technological capability has been widely used in the previous scholarly work (García, Avella, & Fernández, 2012; Zahra & George, 2002), some authors point on the difficulty of measuring of the knowledge transfer and its evolution over stages of the transfer (Szulanski, 2000). Accordingly, Szulanski (2000) claims that "a transfer is more likely to be perceived as difficult or sticky when efforts to resolve transfer problems become noteworthy." In this vein, he points out that "the eventfulness of the knowledge transfer is also likely to depend on the dispositions and abilities of the source and recipient." Nevertheless, and due to the limitation of our secondary data source, we cannot determine the role of the knowledgeable agents in our firms. We do not know if they play a role of a source or a recipient in the process of a knowledge transfer. Hence, we acknowledge this limitation of our measure of the capability to adopt and transfer knowledge.

Control variables

In our models we also control for factors that could systematically affect innovation in firms. First, we include a control variable that captures firms' export intensity, defined as the percentage of exports made by a company over its total sales. Second, we control for a firm size by including a control variable that captures the number of total personnel employed at the company at time *t*. Both variables "export intensity" and "number of employees" enter our estimation models in a log-linear form due to their skewed distribution. Third, we include variables like "market dynamism" and "competition" to control for specific determinants of the Spanish market. The variable "market dynamism" is categorical and it classifies companies according to the value of the Markets' Dynamism Index during the year (i.e., category 1 stands for a recessive market; category 2 for a stable market; and 3 for an expansive market). The variable "competition" indicates the number of competitors of the company in the main market for its products. It takes the value of 1 if the number of competitors is less than 10; 2 if it is between 11 and 25; 3 for more than 25 competitors; and 4 if the market is atomized. Finally, we also include dummies for each year and the industry, based on the sum of the 3-figures CNAE-09 codes to control for temporal effects.

Moderating variable

We are interested in determining how family involvement moderates the relationship between firm's capabilities and innovation. The ESEE database includes only limited information about the controlling family, (i.e., number of owners and owner's relatives who occupy top managerial positions in family firms). Nevertheless, previous scholarly research has assumed, and empirically validated, that "a family's vision and goals are highly correlated to the extent of family involvement in the firm" (Gomez-Mejia, Makri, & Larraza-Kintana, 2010; Kotlar et al., 2013). We follow this view and use the given measure of a number of owners and owner's relatives who occupy top managerial positions in family firms to capture the "family involvement" in a family firm. Furthermore, and to check the robustness of our results, we apply the ratio of family involvement (measured by the number of family owners and managers on a logarithm of the total personnel in family firms in time *t*), and use it interchangeably with the variable "family involvement."

Table 2 presents descriptive statistics for all the variables used in our models both with all the observations (3,365 firms), and also when splitting the sample by considering only family-controlled firms (obs. 2,196). Table 3 shows the correlations of the variables used in our study. There, we can see that all VIF scores are below 2.15, indicating that multicollinearity was not an issue in our models.

Insert Table 2 about here

Insert Table 3 about here

Finally, table 4 includes more descriptive statistics showing the differences between firms that reported innovating in products and processes versus the non-innovative firms. Again, the results for the full sample (3,365 firms) are presented, and also for the sub-samples of family firms (2,196 firms) and non-family firms (1,169 firms). We find that family firms differ from non-family firms in terms of their use of the capability to transfer and adopt knowledge and its impact on product innovation. That is, family firms show a preference of using the technological capability over the capability to transfer and adopt knowledge to enhance their product innovations, whereas we find the opposite in non-family firms. Table 11 in appendix provides a description of all variables used in our estimation models.

Insert Table 4 about here

4. Results

Due to the panel composition and the binary nature of two dependent variables in our models, i.e., the product and process innovation, we estimate fixed-effects[7] logit models. In relation to the dependent variable that measures the number of product innovations, we estimate a fixed-effects negative binomial regression since the dependent variable is a count. In addition, we follow the methodology on assessing moderations in logistic regressions outlined by Aiken and West (1991), and later evaluated by Dawson (2014). Hence, we report the coefficients, standard errors, and level of significance for all variables in our models. We have also calculated the magnitude of the effect of a change in the independent variables for all significant interactions in our models. To graph the effect of family involvement on the relationship between a firm's capability and innovation, we have plotted our results of the estimation for product innovation (i.e., there we observe a significant impact of family involvement on both types of capabilities) using values for each independent variable that were two standard deviations below the mean and two standard deviations above the mean. Finally, for each model we also report the change in the model fit using the change in the log-likelihood.

Tables 5-7 present the results of the fixed-effects regressions testing our hypotheses in relation to firm's product innovation, process innovation and the number of product innovations, respectively. Model 1 presents the results of the control variables, while model 2 adds independent variables like the firm's capabilities and the moderator – family involvement. Model 3 includes the interaction term between a family involvement and a firm's capability to transfer and adopt knowledge while model 4 shows the interaction effect of family involvement on the technological capability. Finally, model 5 presents the results for the impact of family involvement on both types of capabilities and model 6 shows the effect of the moderating impact of the lagged family involvement and the lagged capabilities (at the time *t-1*) on innovation.

Hypotheses 1 and 2 predict that a higher family involvement would moderate the firm's capabilities in such way that, finally, it diminishes the likelihood of a family firm innovation (*see tables 5-7, model 5*). In relation to firm's product innovation, our results

[7] This is due to a significant result of the Hausman tests verifying that fixed-effects models were more suitable than random-effects in all three estimations (Hausman, 1978).

show supporting evidence with respect to hypothesis 1, but not for hypothesis 2. Hence, family involvement has a negative impact on firm's capability to transfer and adopt knowledge (measured by the relative proportion of engineers and graduates over the total personnel of the company) and product innovation. However, and contrary to our prediction, it enhances the positive link between a firm's technological capability (measured by its relative R&D expenditures) and product innovation. More precisely, the coefficient of the interaction variable between family involvement and a firm's capability to transfer and adopt knowledge on the firm's probability to innovate in products of -0.219 is significant at 0.01, and the coefficient for the interaction between family involvement and a firm's technological capability on product innovation of 0.114 is also significant at 0.05. As family involvement within a firm moves from minus to plus two standard deviations, a firm's likelihood to innovate in products despite having a superior capability to transfer and adopt knowledge decreases by 13.21 percentage points. Whereas, as the family involvement within a firm moves from minus to plus two standard deviations, a firm's likelihood to innovate in products that have a superior technological capability increases by 5.22 percentage points.

Insert Table 5 about here

The result of our estimations with respect to process innovation provide supporting evidence for the hypothesis 1, but again, not the hypothesis 2. The coefficient for the interaction between family involvement and a firm's capability to transfer and adopt knowledge on the firm's probability to innovate in processes of -0.0761 is significant at 0.1, and a firm's probability to innovate in processes despite having a superior capability to transfer and adopt knowledge decreases by 2.79 percentage points.

Insert Table 6 about here

Finally, we also find a supporting evidence in terms of the moderating impact of family involvement on the capability to adopt and transfer knowledge and the number of product innovations. The coefficient for the interaction between family involvement and firm's capability to transfer and adopt knowledge on the firm's number of product innovations of -0.0832 is significant at 0.01. As the family involvement within a firm moves from minus to plus two standard deviations, a firm's likelihood to report a higher number of product innovations despite having a superior capability to transfer and adopt knowledge decreases by 58.45 percentage points.

Insert Table 7 about here

To present a contrary influence of family involvement on different types of capabilities and a firm's innovation, we graph those interactions that showed the significant impact of family involvement on both, the capability to transfer and adopt knowledge and the technological capability, in our estimations. As a result, figure 2 presents the results with respect to the likelihood of product innovation and the capability to adopt and transfer knowledge at lower and higher family involvement levels, whereas figure 3 corresponds to the likelihood of product innovation and the technological capability. To present meaningful plots of the results, we have calculated the predicted value for each observation in our sample at a number of a lower and higher level of family involvement (from - 2 s.d. to + 2 s.d.), as well as either high or low capabilities. We have then calculated the average of the predicted values at each level and plotted the results (Dawson, 2014).

The graphs of the interactions suggest, as mentioned above, that the effects of family involvement on the firm's likelihood to innovate are moderated in different ways when there is a low or a high proportion of family owners and managers employed in a family firm. Specifically, figure 2 shows that the likelihood of engaging in product innovation decreases as family involvement increases. When a family firm owns a superior capability to transfer and adopt knowledge, the likelihood that a family firm has a higher willingness to innovate in products is not greater than when the firm has a lower capability to transfer and adopt knowledge, if the family involvement is high in those firms. However, we find a contrary interdependency when plotting the impact of family involvement on the technological capability and product innovation. Figure 3 shows that in those family firms with a superior technological capability, when more family owners and managers are actively working in the firm, we observe an increase in their probability to innovate in products, if the family involvement is high in those firms.

Insert Figure 2 about here

Insert Figure 3 about here

5. Robustness

Tables 8-10 in appendix show the results of our estimations testing for their robustness in relation to firm's product innovation, process innovation and the number of product

innovations, respectively. Model 1 presents the results for the interaction effect of family involvement on firm's capabilities and innovation for small and medium sized firms only, whereas model 2 for those large firms which reported employing more than 250 employees. Model 3 shows the results of our estimation scaling all variables by the logarithm of a number of employees. Similarly, model 4 shows the results of our estimations when the variable of "family involvement" has been substituted by the "ratio of family involvement." This new measure captures the proportion of the family owners and managers on the logarithm of a total number of personnel of family firms. Finally, model 5 is an extension of the model 4 and presents the results of our estimation with a lagged "ratio of family involvement" as well as the lagged capabilities. The results of the impact of family involvement on the relationship between a firm's capabilities and innovation appear robust[8] in the estimations which relate to product innovation and a number of innovative products, but not process innovation. That is, we find a higher family involvement significantly weakens the positive link between a firm's capability to transfer and adopt knowledge (a general-purpose capability) and product innovation (or multiple product innovations), but it strengthens the positive link between the technological capability (a market-specific capability) and product innovation.

Insert Table 8 about here

Insert Table 9 about here

Insert Table 10 about here

6. Discussion

Previous work have suggested that those family firms looking for gains in their competitive advantage (through their product innovation) should attempt to create and maintain the capability to transfer and adopt knowledge, as well as, their technological capability. Our results show that family firms do not always choose the strategy, which best exploits the family firm's general-purpose capabilities, as compared with the non-family firms. More precisely, family involvement weakens the positive link between a family firm's capability to transfer and adopt knowledge (measured by the relative proportion of engineers and graduates on the total personnel of the company) and

[8] With an exception of testing the moderating impact of family involvement on the capabilities and product innovation in large Spanish firms.

product innovation (or multiple product innovations), but it strengthens the positive link between the technological capability and firm's product innovation. In fact, family owners and managers seem to be hesitant to innovate in products and they seem to prefer to diminish firm's superior capability formed by its outsiders even though they are highly skilled. One possible interpretation is that family owners and managers view non-family highly skilled employees as the competitors rather than effective collaborators. This "mistrust" can drive the family owners and managers to make foolish decisions on resource allocation. In fact, we view this circumstance as the possible root cause of family firm's unwillingness to innovate. Precisely, family firms learn to trust in the family members' commitment and dedication to the firm from the early stage of a family firm life cycle. Building such a trust-related connection with non-family workforce requires consistent effort and time. Hence, it may be that family owners and managers do not assess commitment and dedication on the part of the non-family employees in the same way. We also argue that, due to the effects of SEW preservation, this "mistrust" may have a more harming impact on the product innovation(s) of those family-founder run firms rather than on those controlled by the next generation of family members. Briefly, we observe that in family firms the "mistrust" towards non-family workforce can provoke the family SEW issues.

7. Conclusion

In this study we have attempted to increase family scholars' and business practitioners' understanding of how specific firm's capabilities are impacted by family involvement. We claim that our results study have helped to throw some light into the understanding on the family firm's innovation paradox. We have analyzed "the ability and willingness paradox" through the lenses of the resource based view (RBV) and SEW preservation. We have sought to inform family firms how to take better capabilities' allocation decisions, and as a result, become more innovative. We have also shown that family firms underperform in terms of allocating their superior capabilities to transfer and adopt knowledge (the general-purpose capability) to achieve product innovation(s) and process innovation. This study draws the recommendation that family businesses ought to take "paths" that can allow them to use their superior capabilities to adopt and transfer knowledge and technological capability to increase their "willingness" to

innovate in products. “Breaking the ice” with innovation is one of the challenges that family firms experience, and a better use of their firm’s capabilities can significantly ease this process.

Nevertheless, we believe that more detailed databases and further international comparisons could improve our understanding of the family firm’s innovation paradox. We propose that additional research using sampling frames other than Spanish manufacturing firms is needed to extend the validity of our findings to firms outside Spain. A limitation of this study relies also on the usage of secondary data sources. As a consequence, and similar to other studies, we have measured the family involvement by the number of family owners and managers (Chrisman & Patel, 2012; Gomez-Mejia et al., 2010). We also encourage future research to explore other ways of measuring a transferability of an “organizational knowledge.” We call family business scholars to continue exploring “the ability and willingness paradox” of family firm innovation.

Figure 1: Research model

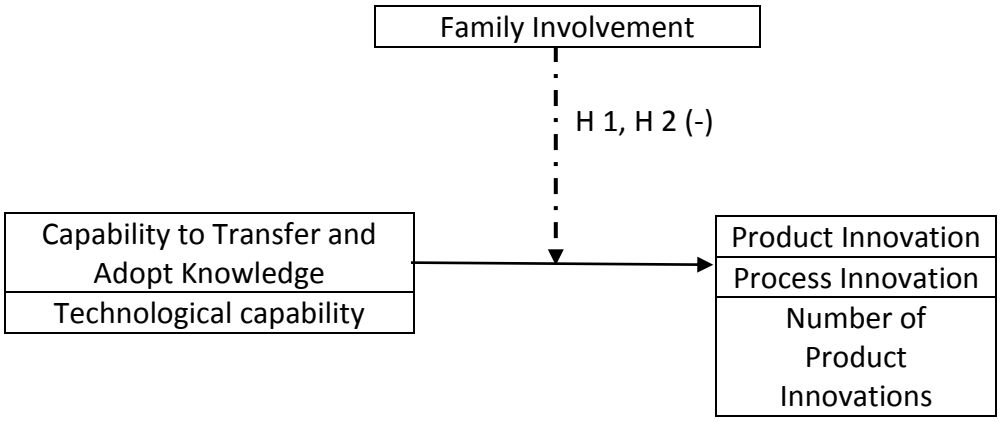


Figure 2: Family involvement on the capability to adopt and transfer knowledge and product innovation

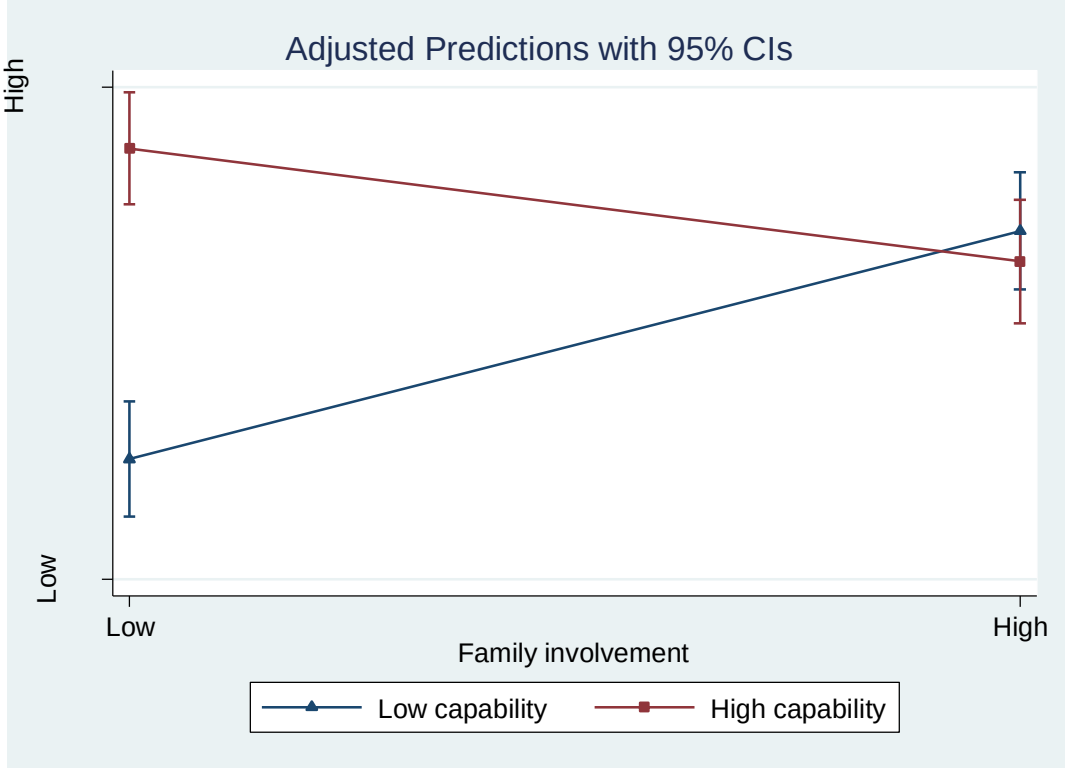


Figure 3: Family involvement on the technological capability and product innovation

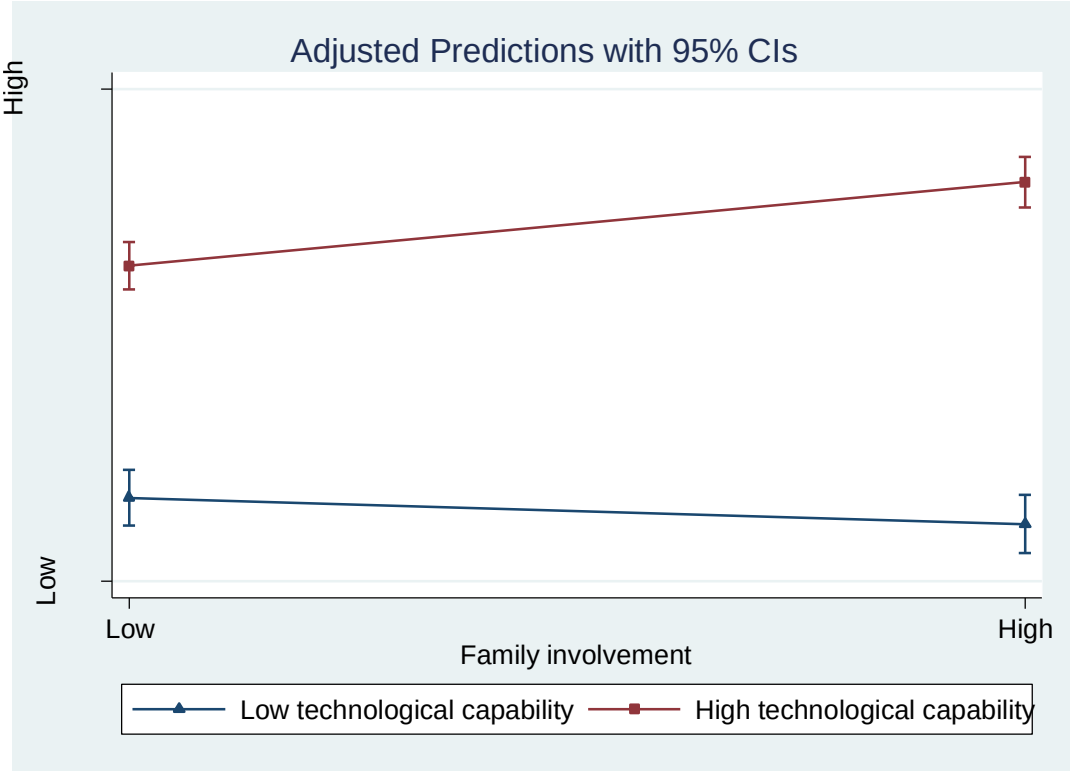


Table 1: Industry Breakdown of the Total Sample (Obs. 3,365)

Industry	Percentage of firms	Avg. employees	Avg. product innovation	Avg. process innovation	Avg. number of product innovations
1. Meat products	2.34	220.685	0.1776	0.3046	0.9182
2. Food and tobacco	8.66	210.334	0.2026	0.3049	0.9697
3. Beverage	2.18	283.647	0.2204	0.3606	0.7139
4. Textiles and clothing	8.77	129.153	0.1965	0.2193	4.4777
5. Leather, fur and footwear	3.22	40.003	0.1795	0.1629	5.0156
6. Timber	3.32	87.968	0.0938	0.2500	0.2100
7. Paper	2.68	201.160	0.1789	0.3688	1.1541
8. Printing	4.78	131.519	0.0758	0.2523	1.4910
9. Chemicals and pharmaceuticals	6.14	300.504	0.3422	0.4111	2.2895
10. Plastic and rubber products	5.18	190.869	0.2403	0.3620	2.3787
11. Nonmetal mineral products	6.64	195.861	0.1600	0.2626	1.3442
12. Basic metal products	2.76	508.109	0.1977	0.4331	3.0717
13. Fabricated metal products	11.80	111.183	0.1271	0.3129	1.1638
14. Machinery and equipment	7.18	161.874	0.3174	0.3229	1.6061
15. Computer products, electronics and optical	3.32	348.170	0.4741	0.3950	4.1993
16. Electric materials and accessories	6.22	288.881	0.3079	0.3920	3.5525
17. Vehicles and accessories	4.76	858.735	0.2996	0.5028	2.0434
18. Other transport equipment	2.29	607.202	0.3001	0.3806	0.7969
19. Furniture	5.13	82.675	0.2479	0.2454	2.1724
20. Other manufacturing	2.63	102.902	0.2453	0.2964	4.5318
Full sample	100.00	253.072	0.2292	0.3270	2.2050

Table 2: Descriptive Statistics (Full sample, Obs. 3,365)

Variable	Mean	Standard deviation			Min	Max
		Overall	Between	Within		
Full sample (Obs. 3,365)						
Product innovation	0.2206	0.4147	0.2947	0.3030	0	1
Process innovation	0.3201	0.4665	0.3024	0.3678	0	1
Number of product innovations	2.1451	14.7307	8.8597	11.7591	0	650
Family involvement	0.7052	0.9648	0.7559	0.6316	0	9
Ratio of family involvement	0.0321	0.0607	0.0489	0.0392	0	1
Capability to transfer and adopt knowledge	0.3536	0.4781	0.4010	0.2851	0	1
Technological capability	0.2003	0.4002	0.3136	0.2517	0	1
Export intensity [a]	17.724	25.638	23.029	9.938	0	100
Number of employees [b]	230.775	686.588	663.096	186.345	1	15,003
Market dynamism	2.0181	0.7195	0.4368	0.6097	1	3
Competition	1.9132	1.1853	0.9358	0.7674	1	4
Family-Controlled Firms[9] (Obs. 2,196)						
Product innovation	0.1931	0.3947	0.2747	0.2908	0	1
Process innovation	0.2802	0.4491	0.2789	0.3624	0	1
Number of product innovations	2.0259	15.3803	8.9633	12.5887	0	650
Family involvement	1.0542	1.0118	0.6740	0.7723	0	9
Ratio of family involvement	0.0480	0.0688	0.0525	0.0480	0	1
Capability to transfer and adopt knowledge	0.3007	0.4586	0.3795	0.2806	0	1
Technological capability	0.1553	0.3622	0.2753	0.2326	0	1
Export intensity [a]	12.909	22.468	20.467	8.654	0	100
Number of employees [b]	99.503	265.442	245.022	115.861	1	12,943
Market dynamism	2.0338	0.7149	0.4391	0.6021	1	3
Competition	2.0641	1.2249	0.9448	0.8110	1	4

[a,b] Those variables enter our models in a log-linear form due to their skewed distribution

[9] In this study we define a firm as a family-controlled if the ESEE survey's respondent has reported a number higher than 0 of family owners or manager working in her firm for at least one the years in the period between 1991 and 2011.

Table 3: Correlation raw data (Full sample)

Variable	1	2	3	4	5	6	7	8	9	10	11
Product innovation	1										
Process innovation	0.3438***	1									
Number of product innovations	0.2738***	0.0959***	1								
Family involvement	-0.0502***	-0.0545***	-0.0055	1							
Ratio of family involvement	-0.1152***	-0.1416***	-0.0344***	0.5855***	1						
Capability to transfer and adopt knowledge	0.1121***	0.1013***	0.0250***	-0.0881***	-0.1180***	1					
Technological capability	0.3470***	0.2602***	0.1097***	-0.0847***	-0.1638***	0.2051***	1				
Log(Export intensity)	0.2319***	0.2073***	0.0829***	-0.1814***	-0.2881***	0.2093***	0.3011***	1			
Log(Number of employees)	0.2576***	0.2923***	0.0749***	-0.2849***	-0.5060***	0.2218***	0.3426***	0.5251***	1		
Market dynamism	-0.0744***	-0.1147***	-0.0198***	0.0298***	0.0962***	-0.0406***	-0.0619***	-0.0704***	-0.1143***	1	
Competitors	-0.1230***	-0.1274***	-0.0176***	0.1215***	0.1684***	-0.1243***	-0.1330***	-0.1656***	-0.2973***	0.0657***	1
VIF	2.12	2.12	2.12	2.10	2.09	2.12	2.12	2.10	2.09	2.12	2.12

Note: Industry dummies and country dummies not displayed to preserve space.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Comparing Innovative versus Non-Innovative Firms (Full sample)

Variable	Product innovation	Process innovation	Product/Process innovation (b)	No innovation (B)	Δ (b-B)
Full Sample (Obs. 3,365)					
Family involvement	0.6141	0.6285	0.6452	0.7457	-0.1005***
Ratio of family involvement	0.0190	0.0196	0.0213	0.0394	-0.0181***
Capability to transfer and adopt knowledge	0.4543	0.4242	0.4219	0.3074	0.1145***
Technological capability	0.4613	0.3521	0.3589	0.0929	0.2660***
Export intensity [a]	25.931	23.980	23.530	13.796	9.734***
Number of employees [b]	430.498	394.049	362.148	141.896	220.252***
Market dynamism	1.9174	1.8978	1.9182	2.0857	-0.1675***
Competitors	1.6392	1.6931	1.7041	2.0548	-0.3507***
Family Controlled Firms (Obs. 2,196)					
Family involvement	1.0491	1.0732	1.0701	1.0451	0.0250*
Ratio of family involvement	0.0324	0.0335	0.0354	0.0553	-0.0199***
Capability to transfer and adopt knowledge	0.4062	0.3711	0.3696	0.2613	0.1083***
Technological capability	0.4351	0.3020	0.3158	0.0635	0.2523***
Export intensity [a]	21.630	17.851	18.111	9.934	8.177***
Number of employees [b]	179.456	161.752	149.515	70.904	78.611***
Market dynamism	1.9132	1.8771	1.9027	2.1087	-0.2060***
Competitors	1.7810	1.8319	1.8450	2.1894	-0.3444***
Non-family Firms (Obs. 1,169)					
Capability to transfer and adopt knowledge	0.5222	0.4993	0.5014	0.4222	0.0792***
Technological capability	0.4983	0.4228	0.4244	0.1662	0.2582***
Export intensity [a]	32.004	32.647	31.762	23.414	8.348***
Number of employees [b]	785.288	722.602	685.242	318.725	366.517***
Market dynamism	1.9235	1.9271	1.9417	2.0284	-0.0867***
Competitors	1.4390	1.4970	1.4901	1.7195	-0.2294***

*** p<0.01, ** p<0.05, * p<0.1

[a,b] Those variables enter our models in a log-linear form due to their skewed distribution

Table 5: Estimating the Moderating Impact of Family Involvement on Firm's Capabilities and Product Innovation (logit model)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6[a]
Independent variables						
Capability to transfer and adopt knowledge		0.283***	0.261***	0.285***	0.416***	0.289***
		(0.0621)	(0.0625)	(0.0621)	(0.0689)	(0.0756)
Technological capability		1.142***	1.137***	1.152***	1.069***	0.452***
		(0.0583)	(0.0583)	(0.0585)	(0.0655)	(0.0697)
Moderating variable						
Family involvement		0.0307	0.0276	0.0191	0.0134	0.0127
		(0.0276)	(0.0278)	(0.0284)	(0.0286)	(0.0309)
Interaction terms						
Capability to transfer and adopt knowledge* Family involvement			-0.208***		-0.219***	-0.125**
			(0.0492)		(0.0498)	(0.0538)
Technological capability* Family involvement				0.0922*	0.114**	0.0642
				(0.0497)	(0.0505)	(0.0530)
Control variables						
Log(Export intensity)	0.110***	0.0987***	0.0985***	0.0985***	0.0982***	0.0920***
	(0.0286)	(0.0292)	(0.0293)	(0.0292)	(0.0292)	(0.0322)
Log(Number of employees)	0.447***	0.408***	0.406***	0.410***	0.410***	0.467***
	(0.0603)	(0.0619)	(0.0620)	(0.0619)	(0.0620)	(0.0685)
Market dynamism	-0.0913***	-0.0797***	-0.0779***	-0.0797***	-0.0779***	-0.0613*
	(0.0296)	(0.0301)	(0.0301)	(0.0301)	(0.0301)	(0.0329)
Competition	-0.0956***	-0.0889***	-0.0878***	-0.0893***	-0.0882***	-0.129***
	(0.0247)	(0.0252)	(0.0252)	(0.0252)	(0.0252)	(0.0279)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	19,002	19,002	19,002	19,002	19,002	15,628
Number of firms	1,661	1,661	1,661	1,661	1,661	1,446
Log likelihood	-7100.4644	-6884.8607	-6875.8978	-6883.1345	-6873.349	-5778.1959
Change in fit		-215.6037	-8.9629	-1.7262	-11.5117	-1095.1531

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

Table 6: Estimating the Moderating Impact of Family Involvement on Firm's Capabilities and Process Innovation (logit model)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6[a]
Independent variables						
Capability to transfer and adopt knowledge		0.196***	0.193***	0.716***	0.247***	0.0982
		(0.0518)	(0.0518)	(0.0530)	(0.0581)	(0.0641)
Technological capability		0.712***	0.710***	0.197***	0.682***	0.355***
		(0.0528)	(0.0528)	(0.0518)	(0.0591)	(0.0635)
Moderating variable						
Family involvement		0.0407*	0.0394*	0.0391*	0.0374*	0.0326
		(0.0223)	(0.0223)	(0.0224)	(0.0224)	(0.0243)
Interaction terms						
Capability to transfer and adopt knowledge* Family involvement			-0.0732*		-0.0761*	-0.0576
			(0.0400)		(0.0402)	(0.0439)
Technological capability* Family involvement				0.0416	0.0470	0.0689
				(0.0437)	(0.0438)	(0.0469)
Control variables						
Log(Export intensity)	0.0692***	0.0646***	0.0648***	0.0645***	0.0647***	0.0442*
	(0.0236)	(0.0238)	(0.0238)	(0.0238)	(0.0238)	(0.0261)
Log(Number of employees)	0.626***	0.604***	0.605***	0.606***	0.606***	0.613***
	(0.0531)	(0.0535)	(0.0535)	(0.0535)	(0.0535)	(0.0594)
Market dynamism	-0.176***	-0.173***	-0.173***	-0.173***	-0.173***	-0.159***
	(0.0249)	(0.0250)	(0.0250)	(0.0250)	(0.0250)	(0.0274)
Competition	-0.0878***	-0.0842***	-0.0840***	-0.0843***	-0.0841***	-0.0885***
	(0.0194)	(0.0195)	(0.0195)	(0.0195)	(0.0195)	(0.0216)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	25,131	25,131	25,131	25,131	25,131	21,258
Number of firms	2,245	2,245	2,245	2,245	2,245	2,028
Log likelihood	-10286.646	-10182.37	-10180.699	-10181.917	-10180.123	-8603.8707
Change in fit		-104.276	-1.671	-0.453	-2.247	-1576.2523

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

Table 7: Estimating the Moderating Impact of Family Involvement on Firm's Capabilities and Number of Product Innovations (negative binomial regression)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6[a]
Independent variables						
Capability to transfer and adopt knowledge		0.0758**	0.0646**	0.0763**	0.124***	0.0717*
		(0.0316)	(0.0319)	(0.0316)	(0.0354)	(0.0390)
Technological capability		0.789***	0.786***	0.791***	0.771***	0.509***
		(0.0305)	(0.0305)	(0.0307)	(0.0341)	(0.0371)
Moderating variable						
Family involvement		0.0374**	0.0374**	0.0307*	0.0288*	0.0231
		(0.0150)	(0.0149)	(0.0172)	(0.0172)	(0.0185)
Interaction terms						
Capability to transfer and adopt knowledge* Family involvement			-0.0814***		-0.0832***	-0.0384
			(0.0279)		(0.0279)	(0.0306)
Technological capability* Family involvement				0.0214	0.0269	0.00944
				(0.0266)	(0.0265)	(0.0292)
Control variables						
Log(Export intensity)	0.0935***	0.0642***	0.0654***	0.0640***	0.0651***	0.0683***
	(0.0127)	(0.0128)	(0.0129)	(0.0128)	(0.0129)	(0.0143)
Log(Number of employees)	0.146***	0.0922***	0.0894***	0.0918***	0.0888***	0.120***
	(0.0149)	(0.0154)	(0.0154)	(0.0154)	(0.0154)	(0.0173)
Market dynamism	-0.0750***	-0.0540***	-0.0540***	-0.0537***	-0.0536***	-0.0502**
	(0.0179)	(0.0178)	(0.0179)	(0.0179)	(0.0179)	(0.0195)
Competition	-0.0809***	-0.0707***	-0.0711***	-0.0706***	-0.0710***	-0.0848***
	(0.0143)	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.0158)
Constant[b]	-1.104***	-1.166***	-1.146***	-1.167***	-1.166***	-1.183***
	(0.146)	(0.148)	(0.149)	(0.148)	(0.150)	(0.160)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	19,820	19,820	19,820	19,820	19,820	16,443
Number of firms	1,798	1,798	1,798	1,798	1,798	1,609
Log likelihood	-22423.917	-22073.62	-22069.324	-22073.295	-22068.808	-18527.542
Change in fit		-350.297	-4.296	-0.325	-4.812	-3541.266

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

[b] Note: Some groups dropped because of all zero outcomes (conditional FE negative binomial regression)

8. References

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.

Alegre, J., & Chiva, R. (2008). Assessing the impact of organizational learning capability on product innovation performance: An empirical test. *Technovation, 28*(6), 315–326.

Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family Business Review, 25*(3), 258–279.

Cabrera-Suárez, K., De Saá-Pérez, P., & García-Almeida, D. (2001). The succession process from a resource-and knowledge-based view of the family firm. *Family Business Review, 14*(1), 37-46.

Carney, M. (2005). Corporate Governance and Competitive Advantage in Family-Controlled Firms. *Entrepreneurship Theory and Practice,* 249–265.

Cassiman, B., & Veugelers, R. (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science, 52*(1), 68–82.

Chrisman, J. J., Chua, J. H., De Massis, A., Frattini, F., & Wright, M. (2015). The ability and willingness paradox in family firm innovation. *Journal of Product Innovation Management, 32*(3), 310–318.

Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D Investments of Family and Nonfamily Firms: Behavioral Agency and Myopic Loss Aversion Perspectives. *Academy of Management Journal, 55*(4), 976–997.

Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology, 29*(1), 1–19.

Dosi, G., Faillo, M., & Marengo, L. (2008). Organizational Capabilities, Patterns of Knowledge Accumulation and Governance Structures in Business Firms: An Introduction. *Organization Studies, 29*(8–9), 1165–1185.

Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Academy of Management Journal, 59*(4), 1224–1264.

Fang, H. C., Memili, E., Chrisman, J. J., & Penney, C. (2016). Industry and Information Asymmetry: The Case of the Employment of Non-Family Managers in Small and Medium-Sized Family Firms. *Journal of Small Business Management,* 1–17.

García, F., Avella, L., & Fernández, E. (2012). Learning from exporting: The moderating effect of technological capabilities. *International Business Review, 21*(6), 1099–1111.

Gomez-Mejia, L. R., Makri, M., & Larraza-Kintana, M. (2010). Diversification Decisions in Family-Controlled Firms. *Journal of Management Studies, 47*(2), 223–252.

Gomez-Mejia, L. R., Takács Haynes, K., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional Wealth and Business Risks in Family-controlled Firms: Evidence from Spanish Olive Oil Mills. *Administrative Science Quarterly, 52*(1), 106–137.

Habbershon, T. G., & Williams, M. L. (1999). Introduction A Resource-Based Framework for Assessing the Strategic Advantages of Family Firms. *Family Business Review, 12*(1), 1–26.

Hausman J. 1978. Specification tests in econometrics. *Econometrica 46*(6): 1251–1271.

Hatak, I., Kautonen, T., Fink, M., & Kansikas, J. (2016). Innovativeness and family-firm performance: The moderating effect of family commitment. *Technological Forecasting and Social Change, 102*, 120–131.

Klein, S., & Bell, F. (2007). Non-family executives in family businesses: A literature review. *Journal of Family Business Studies, 1*(1), 19–37.

Kotlar, J., De Massis, A., Frattini, F., Bianchi, M., & Fang, H. (2013). Technology acquisition in family and nonfamily firms: A longitudinal analysis of Spanish manufacturing firms. *Journal of Product Innovation Management, 30*(6), 1073–1088.

Lee, H., & Kelley, D. (2008). Building dynamic capabilities for innovation: an exploratory study of key management practices. *R&D Management, 38*(2), 155–168.

Llach, J., & Nordqvist, M. (2010). Innovation in family and non-family businesses: A resource perspective. *International Journal of Entrepreneurial Venturing, 2*(3-4), 381-399.

Miller, D., & Le Breton-Miller, I. (2006). Family Governance and Firm Performance, and Capabilities. *Familiy Business Review, 19*(1), 73–87.

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2015). The impact of family ownership, management, and governance on innovation. *Journal of Product Innovation Management, 32*(3), 319–333.

Minichilli, A., Corbetta, G., & MacMillan, I. C. (2010). Top Management Teams in Family-Controlled Companies: “Familiness”, “Faultlines”, and Their Impact on Financial Performance. *Journal of Management Studies, 47*(2), 205–222.

Naldi, L., Nordqvist, M., Sjöberg, K., & Wiklund, J. (2007). Entrepreneurial orientation, risk taking, and performance in family firms. *Family business review, 20*(1), 33-47.

Pisano, G. P. (2016). Towards a Prescriptive Theory of Dynamic Capabilities : Connecting Strategic Choice, Learning, and Competition. *HBS Working Paper 16-146*, (Draft 3.5). Retrieved from *http://hbswk.hbs.edu/item/towards-a-prescriptive-theory-of-dynamic-capabilities-connecting-strategic-choice-learning-and-competition*

Sharma, P., Blunden, R., Labaki, R., Michael-Tsabari, N., & River Algarin, J. O. (2013). Analyzing Family Business Cases: Tools and Techniques. *Case Research Journal, 33*(2), 1–20.

Smith, K. G., Collins, C. J., & Clark, K. D. (2005). Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms. *Academy of Management Journal, 48*(2), 346–357.

Spriggs, M., Yu, A., Deeds, D., & Sorenson, R. L. (2012). Too Many Cooks in the Kitchen: Innovative Capacity, Collaborative Network Orientation, and Performance in Small Family Businesses. *Family Business Review, 26*(1), 32–50.

Szulanski, G. (2000). The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness. *Organizational Behavior and Human Decision Processes, 82*(1), 9–27.

Szulanski, G., Ringov, D., & Jensen, R. J. (2016). Overcoming Stickiness: How the Timing of Knowledge Transfer Methods Affects Transfer Difficulty. *Organization Science, 27*(2), 304–322.

Teece, D. J., Pisano, G. P., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509–533.

Zahra, S. A., & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. Academy of Management Review, 27(2), 185–203.

9. Appendix

Table 8: Testing Robustness of the Moderating Impact of Family Involvement on Firm's Capabilities and Product Innovation

	Model 1 SME	**Model 2** Large	**Model 3** Scaling	**Model 4** Ratio	**Model 5**[a] Ratio
Independent variables					
Capability to transfer and adopt knowledge	0.383*** (0.0803)	0.00130 (0.119)	0.844*** (0.250)	0.409*** (0.0690)	0.305*** (0.0758)
Technological capability	1.327*** (0.0768)	0.841*** (0.108)	5.024*** (0.254)	1.054*** (0.0658)	0.454*** (0.0701)
Moderating variable					
Family involvement	0.0136 (0.0334)	0.0107 (0.0631)	0.113 (0.108)	0.0754 (0.107)	0.0433 (0.117)
Interaction terms					
Capability to transfer and adopt knowledge * Family involvement	-0.234*** (0.0610)	-0.168 (0.105)	-2.392*** (0.627)	-0.775*** (0.186)	-0.570*** (0.203)
Technological capability* Family involvement	0.0382 (0.0631)	0.0965 (0.103)	-0.162 (0.750)	0.542*** (0.201)	0.236 (0.213)
Control variables					
Log(Export intensity)	0.137*** (0.0360)	-0.00292 (0.0564)	0.294*** (0.106)	0.413*** (0.0620)	0.468*** (0.0686)
Log(Number of employees)	-	-	-	0.0985*** (0.0292)	0.0921*** (0.0322)
Market dynamism	-0.0937** (0.0384)	-0.0710 (0.0518)	-0.567*** (0.108)	-0.0780*** (0.0301)	-0.0603* (0.0329)
Competition	-0.0813*** (0.0293)	-0.0592 (0.0539)	-0.360*** (0.0852)	-0.0883*** (0.0252)	-0.129*** (0.0279)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	12,769	5,516	19,002	19,002	15,627
Number of firms	1,180	549	1,661	1,661	1,446
Log likelihood	-4327.5333	-2206.1276	-6894.1336	-6873.269	-5777.1356

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

Table 9: Testing Robustness of the Moderating Impact of Family Involvement on Firm's Capabilities and Process Innovation

	Model 1 SME	**Model 2** Large	**Model 3** Scaling	**Model 4** Ratio	**Model 5**[a] Ratio
Independent variables					
Capability to transfer and adopt knowledge	0.160**	0.248**	0.491**	0.241***	0.0961
	(0.0631)	(0.108)	(0.202)	(0.0583)	(0.0643)
Technological capability	0.800***	0.685***	2.935***	0.666***	0.334***
	(0.0672)	(0.102)	(0.222)	(0.0596)	(0.0641)
Moderating variable					
Family involvement	0.0489*	0.00584	0.107	0.109	0.113
	(0.0258)	(0.0518)	(0.0848)	(0.0847)	(0.0923)
Interaction terms					
Capability to transfer and adopt knowledge * Family involvement	-0.0611	0.0173	-0.637	-0.238	-0.195
	(0.0474)	(0.0919)	(0.486)	(0.148)	(0.162)
Technological capability* Family involvement	-0.00422	0.162*	-0.146	0.286	0.401**
	(0.0544)	(0.0917)	(0.631)	(0.174)	(0.188)
Control variables					
Log(Export intensity)	0.0609**	0.157***	0.118	0.612***	0.617***
	(0.0280)	(0.0490)	(0.0886)	(0.0535)	(0.0594)
Log(Number of employees)	-	-	-	0.0649***	0.0441*
				(0.0238)	(0.0261)
Market dynamism	-0.241***	-0.0483	-1.021***	-0.173***	-0.159***
	(0.0304)	(0.0473)	(0.0896)	(0.0250)	(0.0274)
Competition	-0.0782***	-0.0899*	-0.381***	-0.0838***	-0.0883***
	(0.0218)	(0.0477)	(0.0658)	(0.0195)	(0.0216)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	18,085	6,297	25,131	25,131	21,257
Number of firms	1,698	642	2,245	2,245	2,028
Log likelihood	-7136.3848	-2666.6613	-10217.13	-10180.694	-8603.227

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

Table 10: Testing Robustness of the Moderating Impact of Family Involvement on Firm's Capabilities and Process Innovation

	Model 1 SME	**Model 2** Large	**Model 3** Scaling	**Model 4** Ratio	**Model 5**[a] Ratio
Independent variables					
Capability to transfer and adopt knowledge	0.0912**	0.00820	3.491***	0.124***	0.0807**
	(0.0424)	(0.0558)	(0.130)	(0.0355)	(0.0392)
Technological capability	0.913***	0.666***	0.174	0.750***	0.497***
	(0.0408)	(0.0525)	(0.134)	(0.0342)	(0.0372)
Moderating variable					
Family involvement	0.0100	0.00585	0.0573	0.101	0.0707
	(0.0205)	(0.0355)	(0.0637)	(0.0656)	(0.0722)
Interaction terms					
Capability to transfer and adopt knowledge * Family involvement	-0.0949***	-0.0929*	-1.230***	-0.322***	-0.212*
	(0.0361)	(0.0521)	(0.394)	(0.110)	(0.121)
Technological capability* Family involvement	-0.0391	0.104**	-0.464	0.257**	0.128
	(0.0339)	(0.0515)	(0.357)	(0.107)	(0.120)
Control variables					
Log(Export intensity)	0.0944***	0.00196	0.255***	0.0938***	0.122***
	(0.0150)	(0.0253)	(0.0494)	(0.0158)	(0.0177)
Log(Number of employees)	-	-	-	0.0655***	0.0688***
				(0.0129)	(0.0143)
Market dynamism	-0.0459*	-0.0505*	-0.441***	-0.0533***	-0.0501**
	(0.0239)	(0.0277)	(0.0653)	(0.0178)	(0.0195)
Competition	-0.0876***	-0.0498*	-0.370***	-0.0707***	-0.0847***
	(0.0168)	(0.0282)	(0.0484)	(0.0144)	(0.0158)
Constant[b]	-1.268***	-0.703***	-1.077***	-1.171***	-1.176***
	(0.233)	(0.200)	(0.148)	(0.150)	(0.159)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	13,246	6,002	19,820	19,820	16,442
Number of firms	1,270	637	1,798	1,798	1,609
Log likelihood	-13012.299	-8309.1875	-22093.069	-22067.072	-18524.555

*** p<0.01, ** p<0.05, * p<0.1

[a] Family involvement and capabilities lagged (t-1)

[b] Note: Some groups dropped because of all zero outcomes (conditional FE negative binomial regression)

Table 11: Description of Variables

Variable	Description
Product innovation	Dummy variable which indicates whether a company has achieved product innovations during the financial year.
Process innovation	Dummy variable which indicates whether a company has achieved process innovations during the financial year.
Number of product innovations	Number of product innovations which a company achieved in the financial year.
Family involvement	Number of family owners and relatives who hold managing positions on December 31st.
Ratio of family involvement	Number of family owners and relatives who hold managing positions over the logarithm of the total number of personnel employed in the company on December 31st.
Capability to transfer and adopt knowledge	Dummy variable that takes value 1 if the relative proportion of engineers and graduates over the total personnel of the company is higher or equal to the industry average, and the value 0 otherwise.
Technological capability	Dummy variable that takes value 1 if its relative percentage which represents total expenses in R&D on sales volume is higher or equal to the industry average, and the value 0 otherwise.
Export intensity	Percentage which the exports made by the company represent on its total sales.
Number of employees	Total number of personnel employed in the company on December 31st.
Market dynamism	Categorical variable which classifies companies according to the value of the Markets' Dynamism Index during the year (i.e., category 1 stands for a recessive market; category 2 for a stable market; and 3 for an expansive market).
Competitors	Categorical variable which indicates the number of competitors of the company in the main market for its products. It takes the value of 1 if the number of competitors is less than 10; 2 if it is between 11 and 25; 3 for more than 25 competitors; and 4 if the market is atomized.