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Doctoral Dissertation

Internal corporate governance mechanisms, IT investments,

and firm performance in Ibero-American firms.

Three essays based on institutional perspectives.

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to

Department of Business at

Universitat Autònoma de Barcelona

In partial fulfillment of the requirements for the

degree of Doctor of Philosophy

in Economics, Management, and Organization

Barcelona, April 2023

Acknowledgments

The development of this doctoral thesis was not an easy path, but rather a complex journey of motivating challenges, procrastinating frustrations, and inspiring moments of joy. Throughout this process, I had the great fortune to meet people and institutions who were involved, and without them, this long journey would not have been possible.

First and foremost, I would like to express my gratitude to my advisor, colleague, and friend, Miguel Angel García-Cestona, for accepting me into the doctoral program. Your *Kenkyo-Konki* style of guidance, along with your extensive knowledge in corporate governance and firm theories, acquired through your training with Vicente Salas at the University of Zaragoza and Masahiko Aoki at Stanford University, have allowed me to better comprehend this small grain of sand in the vast sea of knowledge that lies ahead of me. Thank you for our meetings filled with questions and critical thinking, for sharing new ideas, and for inviting me to participate in academic networks with extraordinary colleagues to discuss my progress. I also want to express my gratitude for opening the doors of your home and introducing me to your family: Marta, Miren, and Laura. Amidst the challenges of the Covid pandemic, you didn't hesitate to rescue me from isolation and provide me refuge in the Pyrenees to continue with this project. I will never forget our Monday lunch conversations in the department, which allowed me to learn more about the legacy you carried and the one you imparted to me through anecdotes and stories, such as the car gift you received from Robert Wilson at Stanford, which you and Marta later did the same to support us. In line with your interest in Japanese culture, I would like to share a *Haiku* that summarizes our journey: *As rice grows riper, the lower it bows its head. Never lose your humility while you grow. The wiser, the humbler*. Thank you from the bottom of my heart.

you for opening your doors to me during the most challenging moments of my journey, after the birth of André and during the pandemic. Likewise, to my new directors, Mario Lara and Ruth Aguilera, and the team at the ESADE Center for Corporate Governance. I sincerely thank you for your trust in me, your understanding, and the new challenges. I am a grateful servant. ESAN Graduate School of Business, my alma mater in the field of business and managerial economics, to its authorities, friends, and senior advisors: Jorge Talavera, Martin Santana, and Peter Yamakawa. Your experiences from Pennsylvania State University, Florida International University, and Osaka University, respectively, played a vital role in my gratitude towards the institution for embarking on this journey. To the close colleagues in the famous Area 4 of Operations, Information Technology and Quantitative Methods at ESAN, with special reminders to Eddy Morris and Jhonattan Horna, thank you for being there. To the great friends Jose-Antonio Robles-Flores and Sergio Cuervo, almost like older brothers in mentorship due to "*profe Genaro*," your advice and conversations will always be cherished. To my friend and guide since he was my master's advisor and then my mentor, Genaro Matute, I dedicate this dissertation to you. You planted the initial idea when you showed me your doctoral thesis from UCLA and the field in which I am involved. We did it! May the Lord have you in His infinite glory.

Infinite thanks to my wife, Angelica Amada Castilla Sierra, for her immeasurable understanding, support, and love. And now, with your fascinating academic field in entrepreneurship, from intention to action. She brought me the joy of becoming the father of a divine son, Néstor André Salcedo Castilla. I thank him for the accelerated course in patience and productive effectiveness. Mine son, our conversations now become deeper, and you provide me with more research topics to explore and share. My curious scientist of the universe, galaxies, and systems.

Likewise, I want to express my eternal recognition to my parents, Nestor and Marianella, who never doubted the steps I took and who made me who I am today, with their constant perseverance, curiosity, and empathy. Thank you for taking care of me, Angélica, André, and for your infinite love and support, along with my sister Nella. The reassuring communication across different time zones provided the necessary energy to continue. Thank you, always.

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Introduction

1.1.   Problem statement

After global crises, firms have been the source of continuous transformations, partly driven by their internal corporate governance mechanisms. In addition, in recent decades, the emergence of the new economy has contributed to focus on transformations based on information technology (IT) investment.

On one hand, the internal corporate governance mechanisms are the fundamental basis for the constitution and consolidation of an organization. Firms' owners, boards, and top management teams strategically govern and execute changes and actions through time in the quest to create value. On the other hand, the threshold of this economic perspective allowed to explain how IT investments grew, creating value for firms so that these investments were no longer exclusive to the IT departments but also to the highest-decision levels.

Indeed, the development of growth models that involve technology is not new from an economic perspective (Romer, 1990). However, from the organizational perspective, linking the fields of corporate governance and information technology (IT) has taken slow steps (Kurzhals et al., 2020; Xue et al., 2021). Additionally, from a social perspective, previous studies have focused mainly on the contexts of developed economies and common law at the time of considering the institutional environment (La Porta et al., 2013). Thus, expanding the contributions by making comparisons between developed and developing economies, even under civil law, becomes a necessary step (Aguilera et al., 2019; Aguilera & Jackson, 2010). Furthermore, the different global crises (dot.com, financial, and COVID-19) have also driven the discussions to address both fields: corporate governance and information technology (Drnevich & Croson, 2013).

Consequently, it is not strange that these internal corporate governance mechanisms, also called corporate governance structures, become affected, exogenously and endogenously, by institutional factors (Aguilera & Jackson, 2010) and the IT investment (Ho et al., 2011), which are analyzed through different measures across this study.

According to neo-institutional economics, the decisions of individuals are affected by rules of the game called institutions (North, 1990). According to Williamson (2000) these institutions develop at various levels that in turn serve a purpose. The first level, called embeddedness, includes the informal institutions that encompass customs, traditions, and culture. The second related to the institutional environment comprises the formal rules, bureaucracy and policies with the purpose of giving order to the environment. The third level called governance aligns governance structures with transactions and has the purpose of keeping those governance structures right. Finally, the fourth level, which is constantly changing, is more related to rapid price adjustments and outcomes. This affects not only individual decisions but also organizations. That is why at the business level these institutions affect from the decisions to create companies across countries (Busenitz et al., 2000), through investment decisions (Mahmood et al., 2019), corporate government structures (Aguilera & Jackson, 2010) and therefore the firm performance (Berrone et al., 2022).

Considering these levels, this study is based on the broad theoretical framework that also consider the relationship among the levels and the effect on the organizations (Scott, 1995). As Scott (1995, p. 56) affirm "rules, norms and meanings arise in interaction, and they are preserved and modified by human behavior". Moreover, delving into one of the most important internal corporate governance mechanisms, ownership structure, and its multiple

institutional configurations, could clearly impact investments, such as IT investment, and even incentivize its overinvestment and underinvestment (Ho et al., 2017).

Considering thus the effect that IT investments have on firms and the importance of institutions to moderate management decisions. The next step is to analyze the context of the study and the implications that this thesis has in that regard. This study becomes relevant in the context of Ibero-America due to the lack of registration and data on business technological progress and how the owners decide on it. Both for making decisions and for research in the field. Despite the scant research in this regard, its relevance has been shown as technological development is the first thing adopted by developing countries before innovation and development. This is how Romer (1990) dedicated to macroeconomic studies to analyze the economic growth of countries based on companies, showing that among the priority investments that countries make through their markets is to invest in labor force and acquisition of resources and one of the main before innovation is technology. On the other hand, in the business field, it has also been shown that one of the most important components to reduce the asymmetry of information typical of agency costs and coordination costs, which in turn are typical of transaction costs, is a technological investment (Barro & Sala-i-Martin, 1995, 1997). This means that, with more technology, agency and transaction costs are reduced, which is known as part of the paradoxes of the 1980s when companies began to adopt personal computers because before, they could not. Traditionally, economics shows that as a company grows, its transaction and agency costs grow (Jensen & Meckling, 1976). But when companies began to buy computers and then have new information technologies (such as network connections, operating process software, accounting, commercial, etc.), including the arrival of the Internet in the nineties, the traditional economy began to consider the coining of a new economy, or digital economy since the technological implementation

allowed to reduce the aforementioned costs, and give companies room to continue growing without the need for more expensive infrastructure (Mitra & Chaya, 1996; Shin, 1997).

However, one of the great discussions was raised regarding the usefulness of all the investments, but the lack of information on how much the result is and what are the best mechanisms to exploit these advances. And this is how IT investment began to be considered as a strategic aspect of companies, which should be observed, not only by senior management but also by boards of directors and even owners, since large sums invested in IT were significant.

While there were IT technicians, there was an exceptionally large gap in technology knowledge and experience on the part of owners, board members, and senior management. So, a dilemma was whether it was really being invested appropriately or deviations were being generated that the government structures were not considering.

All these reasons motivate the approach of the leading research question: *how the institutional environment shapes the internal mechanisms of corporate governance that relate to firms' IT investments and firm outcomes?* To approach this question, we focus on Ibero-America (Aguinis et al., 2020; Lazzarini, 2012) and consider a homogeneous group of developing countries that, after the financial crisis, maintained constant growth forming the Pacific Alliance (Chile, Colombia, Peru, and Mexico) and, on the other hand, a developed country with similar civil-law approach, Spain. In this context, this thesis in the first chapter deals with the analysis of whether governance structures were really being affected by external factors and whether these caused changes in their leadership structures. The second chapter analyzes how these largely owner-based governance structures affect IT investments. Finally, Chapter 3 examines an institutionalized ownership structure (such as the family) could have repercussions on the diversion of such investments.

Consequently, each chapter contributes in different ways to approach the research question. Chapter 1 shows the influence of the *external institutional dimension* moderating the corporate governance internal mechanisms' effects on the leadership structure in Ibero-American listed firms (MILA & IBEX). We based on the new institutional economics, linking an external institutional dimension represented by the Worldwide Governance Index (WGI) with the largest shareholders, board independence and CEO turnover to explain the changes in leadership structure. The results show the likelihood to count with fewer firms with independent leadership structures (CEO-Chairman split) due to the moderation effect of the institutional dimension with the board independence and CEO turnover. In contrast, the interaction between the institutional dimension with the largest shareholder would reduce the likelihood of firms with dual leadership structure (CEO-Chairman duality). We contribute to broad the leadership structure field through a new institutional economics view in emerging markets.

Chapter 2 analyzes traditional and new ownership structures, including the growth of IT investment as a novel factor in Ibero-American listed firms: *Mercado Integrado Latinoamericano* (MILA) and the Spanish Stock market (IBEX). (MILA & IBEX) comparing the differences that exist among the environments where the firms are operating. In this chapter the aim is to answer: How does ownership structure, by institutional origin, shape information technology (IT) investment growth? The findings show that concentrated, foreign, and the largest institutional shareholders in MILA affect IT investment growth negatively. IT investment growth is, however, positively affected by new institutional investors in the MILA and IBEX. Additionally, two robustness tests confirm these results through a comparative institutional analysis conducted among Hispanic countries, members and candidates of the OECD, and countries with positive and negative Worldwide Governance Index (WGI).

The research on ownership structures and IT investments is scant. Accordingly, our study seeks to expand that knowledge using a neo-institutional economic framework to support the relationship between the heterogeneity of ownership structures and IT investment growth in Ibero-America. The literature review considers the relevance of concentrated, foreign, and institutional ownership structures on IT investments. We expand these analyses into common ownership (e.g., BlackRock, Vanguard, Fidelity, and State Street). In the face of global crisis (e.g., dot.com, financial, COVID-19), IT investment has become a relevant firm goal that sparks an ongoing debate on the commitment of internal mechanisms to IT.

Chapter 3 goes further by presenting how returns on IT over- or under- investment may be affected by family ownership structures by unlisted firms. To achieve long-term success in a competitive environment, investment in information technology (IT) is key to firm value creation. However, decisions on IT investment are complex, the presence of underinvestment or overinvestment, regarding the industry, is relevant, and ownership seems to play a key role. Recent studies have shown that family ownership can affect the listed firms' returns on IT investment deviations. Nevertheless, little is known about unlisted firms in this context and, until now, how family ownership may generate or mitigate these returns on IT when over or under-investments are present. We aim to answer this question based on an institutional approach focused on legitimacy. The findings show a significant negative effect of IT overinvestment on firm performance. However, this effect is attenuated by the interaction of family ownership. Therefore, the larger the family ownership, the higher returns on IT overinvestment deviation. A robustness procedure with the deviation model, including family concentration, confirms these results.

Finally, considering the individual contributions of each chapter, the main theoretical contribution of this thesis is the comparative use of corporate governance structures

complemented with IT investment under an institutional perspective that considers different levels (country, company, owner). On the other hand, the main practical contribution is the recognition of IT investments in the context of the Pacific Alliance and its relationship with Spain through its stock markets (MILA + IBEX).

1.2.   Theoretical statement

For our purposes, the institutional theoretical framework guides the analysis of the institutional factors that shape economic outcomes and behaviors in the business context (Aguilera & Jackson, 2010; North, 1990; Williamson, 2000). It provides a lens through which we can examine how formal and informal rules, norms, and structures within organizations and in the broader socio-economic environment influence business decisions, practices, and outcomes (North, 1990; Scott, 1995).

The institutional theoretical framework is drawn from the field of institutional economics, which emphasizes the role of institutions in shaping economic behavior (Williamson, 2000). Institutional economics recognizes that economic activities are embedded within social, cultural, and political contexts, and that institutions provide the rules and incentives that govern economic interactions (Scott, 1995).

The framework may draw on various theoretical perspectives within institutional economics, such as new institutional economics, historical institutionalism, or sociological institutionalism (Aguilera & Jackson, 2010). New institutional economics, for example, focuses on the relationship between formal and informal institutions, and how they shape economic outcomes such as transaction costs, property rights, and contract enforcement (North, 1990; Williamson, 2000). Historical institutionalism, on the other hand, examines how path-dependent processes and historical legacies shape institutions and economic outcomes over time (North, 1990). Sociological institutionalism explores how social norms,

values, and beliefs influence economic behavior within organizations and in the wider society (Scott, 1995).

The institutional theoretical framework also considers the relevant literature and empirical evidence in business economics, such as studies on corporate governance, organizational behavior, strategic management, and technology innovation, among others (Aguilera & Jackson, 2010). It provides a theoretical basis for understanding how institutions influence business outcomes and offer a framework for our research design.

Furthermore, the framework may also consider the role of different actors in shaping institutions, such as the government (e.g., through governance perception), regulatory bodies (e.g., through country rules), industries, and other stakeholders (Greenwood et al., 2014). It may also explore the dynamics of institutional change, including factors that drive institutional change, resistance to change, and the consequences of institutional changes for businesses and economies (Aguilera & Jackson, 2010; Powell & DiMaggio, 1991).

In summary, the institutional theoretical framework for our research provides a conceptual foundation for understanding how institutions influence economic behavior in the business context. It draws on theoretical perspectives from institutional economics, considers relevant literature and empirical evidence, and may encompass various aspects of institutions, actors, and institutional change. It serves as a guide for the research design and analysis and contributes to advancing knowledge in the field of business economics.

1.3.   Contextual statement

Corporate governance (CG) scholars have focused their attention on the study of Western developed countries (e.g., the US and EU countries), while Eastern economies (including East Europe and East Asia) have received some attention but less than the first group.

However, emerging economies, such as countries located in the Middle East and North Africa (MENA) region or Ibero-America have been overlooked by CG research.

Unlike many of the Western developed countries previously studied, the particular institutional context of Ibero-America is based on civil law (Aguilera & Jackson, 2010; La Porta et al., 1998, 2013). Under this civil-law tradition, in the case of Latin America, initially created its corporate and capital market laws, providing weak protection for minority shareholders, limited ownership dispersion with high incentives to concentration, and internal financing coming from non-independent banks (Céspedes et al., 2010; Shleifer & Vishny, 1997). Indeed, owing to decades of protectionist economic contexts, Latin America ownership structures show high concentration in the hands of large families or the State (Chong & López-de-Silanes, 2007).

However, after the recession of the so-called Lost Decade of the 1980s in Latin America, these countries refocused their policies on the free market (Schneider, 2008), incorporating suggestions — from supranational institutions such as the International Monetary Fund, the World Bank, the Economic Commission for Latin America and the Caribbean (ECLAC), or the Organization for Economic Cooperation and Development (OECD) — to carry out privatizations of state-owned enterprises (Chong & López-de-Silanes, 2007). Likewise, Spain has been the leading country concerning these institutions with which legal and cultural ties and agreements started to share. Indeed, several privatizations and investments of business groups were from Spain. In addition, these changes allowed the reconfiguration of policies regarding local and foreign institutional investors (Lefort, 2005). All these changes required transparency and accountability through adopting good CG practices since the '90s (Cuomo et al., 2016; Santos et al., 2020; Schamann, 2015). Although these changes evidenced significant growth in the region, they are no longer sustainable, being strongly

impacted by global crises such as Covid-19 or regional crises such as corruption and new waves of political instability.

Some researchers tend to aggregate Ibero-Amercan countries into a single classification despite these countries exhibit a wide variety of economic, political, and social backgrounds. Furthermore, each of these countries is at a different stage on its way to modernizing their CG systems, and the current debate revolves around whether they should converge toward the Anglo-American model. The development of CG systems in this region is also dependent on political governance, characterized in the last years by turbulent events and scandals. A country's CG system is defined by its legal system, financial system, and firm ownership structure (Aguilera, 2009).

Legal systems are also crucial for CG issues (Aguilera & Cuervo-Cazurra, 2004). Ibero-America countries are civil-law countries, which rely, primarily, on statutes and comprehensive codes (La Porta et al., 1998). One related topic tackles the effort of Ibero-American countries to increase transparency in their CG systems to compete globally.

However, Ibero-America shows a high level of heterogeneity between countries. Capital markets are also developing and are characterized by a high entrenchment of corporate ownership and a strong presence of family among private companies.

Firm ownership structure and control are also relevant and have CG implications. In terms of ownership, a common feature of Ibero-America-listed firms is their high degree of ownership concentration. Moreover, among the largest Ibero-American companies, families are the main owners, but the emerging presence of institutional investors is now quite common too.

Chapter 2. External institution effects between internal corporate governance and changes in leadership structure in Ibero-American listed firms

1.   Introduction

Hitherto, many studies have defined the CEO-Chairman dichotomy as the leadership structure's central issue. On the one hand, when the same person holds both positions, CEO-Chairman duality or **dual leadership structure** has been widely discussed by corporate governance researchers to characterize the dual strategic leadership (Brickley, Coles, & Jarrell, 1997; Dalton, Daily, Ellstrand, & Johnson, 1998; Dalton & Dalton, 2011; Finkelstein & D'Aveni, 1994; Krause, Semadeni, & Cannella Jr., 2014). On the other hand, when different persons occupy these positions, CEO-Chairman split or the **independent leadership structure** has been the topic studied by scholars (Brickley et al., 1997; Dalton et al., 1998). Considering this dichotomy (dual/independent), many studies have analyzed corporate governance or firm performance as the possible causes of changes in the leadership structure under, mainly, two theoretical visions (agency theory and resource dependence theory), assuming the traditional principal-agent relationship.

However, these studies on changes in the leadership structure have shown inconclusive results (Dalton & Dalton, 2011; Krause et al., 2014). For instance, these changes may come from the impact of internal mechanisms or external factors on the organization (Balsam et al., 2016; Davidson III et al., 2008) or due to principal-principal relationships. Indeed, prior studies have found the prior firm performance or internal corporate governance mechanisms, such as ownership structures, board attributes, or CEO turnover, are good predictors of changes in leadership structure, as a way to split CEO-Chairman duality (Goyal & Park, 2002) or as an interacting variable to explain that dual leadership structure (Tuggle et al., 2010).

Furthermore, especially after various crises (e.g., dotcom, financial, and others), some discussions have pointed out that these studies of corporate governance and leadership structures should also continue to be expanded as institutional comparative analyses, including interactions of macro-micro variables (Schiehll & Martins, 2016). For instance, some external institutional dimensions (Scott, 1995) at the macro-level could change the corporate governance structures (Briano-Turrent & Rodríguez-Ariza, 2016; Krause et al., 2019). Indeed, recent theoretical contributions have related macro and micro levels to see how we could explain deviance, from a comparative institutional perspective, in governance architectures (Aguilera & Jackson, 2010; Aguilera, Judge, & Terjesen, 2018; Dalton & Dalton, 2011).

Therefore, this study considers the external institutional dimension as a way of comparatively perceiving external governance forces. Regarding this point, we believe that, under an institutional perspective, the Worldwide Governance Index (WGI) (Kaufmann et al., 2011) could interact with internal corporate governance mechanisms and affect the corporate governance architecture, changing the leadership structure, even in developing countries (Aguilera & Jackson, 2010; Briano-Turrent & Rodríguez-Ariza, 2016; Krause et al., 2019).

Consequently, we want to carry out our study using Ibero-American countries that share similarities (e.g., civil law, Hispanic culture, presence of listed firms) and peculiarities (e.g., WGI, corporate governance codes) during a period of low volatility and joint growth. More specifically, we study the Latin American countries belonging to the Alliance Pacific (Mexico, Colombia, Chile, and Peru) along with Spain through its firms listed in the integrated market, MILA, and IBEX, respectively. Indeed, this region has been considered a natural laboratory to test different management theories, with contributions at macro- and micro-levels (Aguinis et al., 2020; Lazzarini, 2012) or comparisons between principal-agent and principal-principal relationships. In that sense, Ibero-American firms become a suitable research opportunity because of the Hispanic connections and post-crisis integration (Schamann, 2015; Spillan &

Virzi, 2017). Therefore, this context allows us to study how the external institutional dimension moderates the internal corporate governance mechanisms' effects on the changes in leadership structure.

2. Theory and hypotheses

2.1. An Ibero-American institutional context

An institutional framework to study corporate governance with Ibero-American listed firms requires analyzing the institutions of key and nearby countries that shape governance, industries, and growth dynamics (Aguilera & Jackson, 2010; Briano-Turrent & Rodríguez-Ariza, 2016; Schamann, 2015). The Ibero-American institutional logic for corporate governance issues shares roots with a civil law approach (La Porta et al., 1998, 2013) coming from Spain for all of Hispanic Latin America. In addition, we focus on Ibero-American integration after the financial crisis, such as the Pacific Alliance (Mexico, Chile, Peru, and Colombia) and Spain through their integrated stock markets called MILA and IBEX, respectively, and in their reported worldwide governance indexes (WGI). Pacific Alliance represents almost 40% of the GDP, 50% of the international trade, and 50% of the FDI of all Latin America (Spillan & Virzi, 2017). Likewise, we include IBEX in the analysis due to the institutional proximity and the maturity in corporate governance from Spain. as done in previous studies that have contributed to the strengthening of Hispanic comparative analysis (Schamann, 2015).

Indeed, MILA countries seek political stability and regulatory quality through their rule of law, government effectiveness, accountability, and corruption control. Regarding this, Mexico and Chile were the first countries to join the OECD (and later came the applications from Colombia and Peru), with Spain as a strategic partner in the organization (Schamann, 2015; Spillan & Virzi, 2017). Likewise, industries such as finance, manufacturing, and services became a priority for these countries (Spillan & Virzi, 2017). Moreover, after the 2008 financial crisis, Chile and Spain had similar positive results in their worldwide governance indexes (WGI).

These results showed the need for institutions with more complete and transparent information for the Ibero-American listed firms (Schamann, 2015).

Nevertheless, some internal corporate governance mechanisms observed in Ibero-American listed firms show the hegemony of the largest shareholders (Cueto, 2010; Kabbach de Castro et al., 2012), as well as the concerns regarding board independence (Schwartz Maranho & Leal, 2018), and the CEO turnover issues (Lafuente & García-Cestona, 2021). Moreover, after the financial crisis, Chile, and Colombia legally restricted CEO-Chairman duality in listed firms, even though it is a recurrent practice in many countries, including Spain, Mexico, and Peru.

Thus, the contribution is to approach how the external institutional dimension (i.e., WGI) moderates the influence of the internal corporate governance mechanisms (Aguilera et al., 2018; Krause et al., 2019) on the likelihood of deviance of corporate governance architectures (i.e., changes in leadership structure). Next, we argue regarding the institutional framework for the changes in leadership structure.

2.2.   Institutional framework for changes in the leadership structure

The institutional theoretical framework (Aguilera & Jackson, 2010; Coase, 1998; Williamson, 2000) is a helpful lens to understand changes in the leadership structures of Hispanic firms listed on stock markets such as MILA and IBEX. On the one hand, the framework argues that organizations are influenced by the broader institutional context in which they operate (North, 1990; Scott, 1995). Institutional dimensions may include cultural norms, legal frameworks, and social conventions (Scott, 1995) (e.g., WGI) that shape how firms govern themselves (i.e., internal corporate governance mechanisms) and the expectations of external or internal stakeholders such as shareholders and directors (Daily, Dalton, & Cannella, 2003; Shleifer & Vishny, 1997). On the other hand, institutions can be formal and informal dimensions at the macro level (North, 1990), shaping social and economic interactions within firms at the micro level and defining the roles of leadership structures (Dalton & Dalton, 2011; Selznick, 1996).

Thus, these institutions provide a framework that guides behavior, constrains actions, and allows coordination among individuals and firms (North, 1990; Scott, 1995). In addition, beyond formal rules and regulations, informal dimensions such as culture and cognition (knowledge) are emphasized in the configuration of institutional changes based on shared beliefs and values that shape the sense of individuals in their organizations (Meijerink, 2011; Scott, 1995).

As a result, changes in leadership structures at Hispanic listed firms can be understood as a response to broader institutional pressures and changes in the institutional context to adapt to new rules and expectations (Briano-Turrent & Rodríguez-Ariza, 2016; Dacin et al., 2002; La Porta et al., 2013).

For instance, changes in external dimensions such as political stability, the rule of law, or regulatory quality (Kaufmann et al., 2011) could influence the corporate governance frameworks of stock markets and industries, creating new expectations for the independence or the integration of the roles of Chairman and CEO. In this context, firms may face pressure to change roles to comply with legal requirements and ensure greater accountability and transparency in their governance structures (Aguilera et al., 2018; Aguilera & Jackson, 2010). In effect, they can make those changes by promoting new ideas or practices around corporate governance (Aguilera et al., 2018), such as adopting best practices from other similar countries or industries (such as it may happen in MILA with the Pacific Alliance countries or in IBEX for the Spanish firms).

Similarly, changes in external dimensions, such as the perception of corruption control and accountability (Kaufmann et al., 2011), could influence the institutional logics that shapes cultural beliefs and values around leadership and authority (Greenwood et al., 2014), potentially creating pressure for firms to modify their leadership structures to reflect the new expectations of shareholders and the board of directors. Indeed, there may be an institutional logic that prioritizes the interests of shareholders over other stakeholders, or another institutional logic

that prioritizes the interests of certain stakeholders over shareholders, seeking a balance and a tendency on the part of the firm to adjust to the norms and values of its institutional environment to gain legitimacy and reduce uncertainty (Aguilera et al., 2018; Powell & DiMaggio, 1991).

Therefore, we propose to study the effects of the Worldwide Governance Index (WGI), that includes political stability, regulatory quality, the rule of law, government effectiveness, corruption control, voice and accountability (Kaufmann et al., 2011), on the internal corporate governance mechanisms of listed firms in different Ibero-American countries (MILA and IBEX). Doing this, we can provide valuable insights into the relationship between external governance dimensions and internal corporate governance structures to shape the changes in leadership structure.

Next, we conduct a literature review of the two traditional types of leadership structure changes (CEO-Chairman split and CEO-Chairman duality) under their respective perspectives (agency theory and resource dependency theory -RDT-), and we extract the basis to argue the macro-micro interactions of the external institutional dimension (WGI) with three internal corporate governance mechanisms (largest shareholder, board independence, CEO turnover) to hypothesize the changes in leadership structure.

2.2.1. *Largest shareholder and changes in leadership structure*

Agency theory suggests that conflicts of interest may arise between the CEO and the shareholders, and the presence of an independent Chairman may mitigate these conflicts. Therefore, independent leadership structures are crucial for effective corporate governance and for mitigating agency problems. You can reduce conflicts of interest and ensure accountability to shareholders. Regarding this relationship, an initial study under the agency theory approach showed that the CEO/founders of small listed firms with concentrated family ownership and

fast-growing had no significant relation to the CEO-Chairman duality (Daily & Dalton, 1992). Indeed, founder CEOs of this study apparently realize the benefit of outside direction and elect to rely on the independent structure in similar degrees as their non-founder cohorts. Nevertheless, another study of small listed firms with few years of age, small board size, small proportion of independent directors, and higher sales had a significant relationship with the CEO-Chairman duality (Daily & Dalton, 1993). In addition, another study later showed that for firms of goods and services industries going into an initial public offering, ownership had significant adverse effects on the CEO/Chairman split (Beatty & Zajac, 1994). Therefore, these would be arguments for deepening the separation between CEO and Chairman.

Moreover, a firm's largest shareholder has significant power to influence corporate decisions, including changes in the leadership structure. If the largest shareholder has a majority stake, he may have a vested interest in the appointment of a Chairman or a CEO that aligns with his/her interests rather than the interests of all shareholders. For instance, one research explored the relationship between outside concentrated ownership structure and independent leadership structures (CEO outside the board) in a bankruptcy context (Daily, 1995). However, there was no support for the presence of a systematic relationship between successful reorganization (positively correlated to an outside concentrated ownership structure) and independent leadership structures. Likewise, there was a positive relationship between liquidation (negatively related to an outside concentrated ownership structure) and independent leadership structures. Despite the empirical defense of the separated leadership structure under this theoretical agency vision (Balsam et al., 2016; Brickley et al., 1997), arguments also emerged that supported CEO-Chairman duality (Dahya, Garcia, & van Bommel, 2009; Finkelstein & D'Aveni, 1994; Iyengar & Zampelli, 2009; Worrell, Nemec, & Davidson III, 1997).

In contrast, the RDT, proposing the board's service-strategic role, suggests that firm owners demand new options in the ownership structure, searching for other value creation alternatives

or more flexibility for dual leadership structure (Drees & Heugens, 2013; Hillman et al., 2009). Following this approach, one study highlights which non-ownership mechanisms (e.g., interlocks and alliances) and ownership mechanisms (e.g., joint ventures or mergers and acquisitions) would lead to relational advantages, suggesting a better explanation of dual leadership structure (Drees & Heugens, 2013). Further, both at the beginning of the life cycle (due to the resource needs) and at the decline of firms (due to expansion or bankruptcy), empirical research supports the RDT approach (Hillman et al., 2009).

Moreover, recent studies on Ibero-American listed-firms have shown that the largest shareholders are in charge of defining business strategies and allocating firms' resources (Kabbach de Castro et al., 2012). Also, there is evidence that a dual leadership structure is negatively related to concentrated ownership, but positively related to family-controlled firms (Briano-Turrent & Rodríguez-Ariza, 2016). Despite the former arguments, research discussions have raised the possibility of going beyond agency and resource dependence perspectives to give way to institutional dimensions (Aguilera & Jackson, 2010; Briano-Turrent & Rodríguez-Ariza, 2016) including possible interactions between macro-level institutions and the micro-level corporate governance (Dalton & Dalton, 2011). Indeed, institutional theory suggests that external institutional dimensions shape organizational behavior and practices (Greenwood et al., 2014; Scott, 1995; Williamson, 2000). Therefore, the external institutional dimension, as measured by the WGI (Kaufmann et al., 2011), would capture the quality of the institutional context related to the government of the country in which a firm operates. A positive index value close to one indicates a better institutional context, which can promote better corporate governance practices. Indeed, stronger governance institutions, as indicated by a positive WGI score, could suggest better safeguards for shareholders' rights and interests. In such environments, there may be a greater expectation for independent leadership structures. Therefore, we present the following hypotheses:

H1a: The likelihood of a change to an independent leadership structure (CEO-Chairman split) in an Ibero-American listed firm, influenced by the largest shareholder, is positvely moderated by the external institutional dimension.

H1b: The likelihood of a change to a dual leadership structure (CEO-Chairman duality) in an Ibero-American listed firm, influenced by the largest shareholder, is negatively moderated by the external institutional dimension.

2.2.2. Board independence and changes in leadership structure

Another critical point is understanding how board independence relates to leadership structure (Dalton & Dalton, 2011). On the one hand, from an agency theory perspective, previous research has shown that a strong board of directors is a key determinant of firm performance, and board independence is essential to ensure that the board is not influenced by the CEO's interests (Balsam et al., 2016; Dalton & Dalton, 2011; Duru, Iyengar, & Zampelli, 2016; Finkelstein & D'Aveni, 1994; Iyengar & Zampelli, 2009; Linck, Netter, & Yang, 2008). Indeed, these studies opened a topic not yet concluded, and that in this last decade have been discussed and addressed in greater depth (Krause et al., 2014, 2017).

Early studies of board independence and leadership structure found that board independence, or "board vigilance", due to the number of independent members, industry concentration, and previous poor firm performance reduce the likelihood of having CEO-Chairman duality (Harrison et al., 1988). In addition, there was evidence that the higher the board vigilance, the higher the likelihood of having firms with CEOs outside the board, even interacting with a greater informal CEO power and with a higher prior firm performance (Finkelstein & D'Aveni, 1994). More recently, a study examined the determinants and performance impact of the external leadership structure (Balsam et al., 2016). The results suggest there is a high likelihood of having independent leadership structures due to higher board independence and less tenure and ownership of CEO. In addition, they found that independent leadership structures with an

external CEO is less appropriate in large firms. Also, the study suggests that firms are more likely to have external CEO following certain institutional conditions.

In contrast, several early RDT-based studies focused on boards have sought to understand how board attributes such as size and others determine critical firm resources (Hillman et al., 2000; Hillman & Thomas, 2003). For these studies, the board composition is not a random attribute, but rather a response to external conditions that make it possible to identify the optimal leadership structure with significant effects on firm performance (Hillman et al., 2009). Several discussions suggest a deeper understanding of what board size and board independence degree should also be related to leadership structure (Krause et al., 2014), including macro institutional conditions (Balsam et al., 2016; Faleye, 2007). In fact, a classic study mentioned that board surveillance could increase CEO-Chairman duality in the face of low informal CEO power and lower previous firm performance (Finkelstein & D'Aveni, 1994). In addition, another study (this time with firms not involved in the financial, utilities, transportation, and food sectors) showed a significant likelihood of keeping firms with a dual leadership structure (i.e., CEO-Chairman duality) due to board independence and board size (Duru et al., 2016).

Although these studies give us two perspectives to interpret these relationships, the external institutional dimension (WGI values) is, in a complementary way, an important factor that can moderate the relationship between board independence and changes in leadership structure (Aguilera & Jackson, 2010). WGI measures the quality of governance in a country, including the effectiveness of the regulatory environment, the rule of law, and the level of corruption (Kaufmann et al., 2011). In countries with high levels of institutional quality, there is likely to be stronger enforcement of regulations that promote board independence and accountability, which in turn reduces the likelihood of having CEO-Chairman duality. For instance, the Ibero-American region consists of countries that share a common language and cultural heritage and, indeed, the Pacific Alliance countries and Spain have similar legal and institutional frameworks

(La Porta et al., 2013). However, the governance practices of firms in this region may differ due to variations in other external institutional dimensions (Scott, 1995; Williamson, 2000) as WGI. Therefore, examining the relationship between board independence, changes in leadership structure, and the external institutional dimension in Ibero-American listed firms is a relevant hypothesis:

> *H2a: The likelihood of a change to an independent leadership structure (CEO-Chairman split) in an Ibero-American listed firm, influenced by board independence, is negatively moderated by the external institutional dimension.*

> *H2b: The likelihood of a change to a dual leadership structure (CEO-Chairman duality) in an Ibero-American listed firm, influenced by board independence, is positively moderated by the external institutional dimension.*

2.2.3. *CEO turnover and changes in leadership structure*

The role that CEO turnover plays on changes in leadership structure is another internal mechanism widely developed in corporate governance (Balsam et al., 2016; Davidson III et al., 2008; Evans et al., 2010; Goyal & Park, 2002; Harrison et al., 1988; Shen & Cannella, 2002). When a CEO turnover occurs, it provides an opportunity for two possible directions: either the CEO-Chairman split to align with market expectations and maintain investor trust as independent leadership structures, or the incoming CEO assume a CEO-Chairman duality to consolidate power and assert greater control over the firm as dual leadership structure.

Initially, one innovative study developed turnover and structural change models in top management positions (Harrison et al., 1988). More specifically, this paper explored the CEO and board's characteristics and relationships through two analyses, one examining CEO and board chair turnover and the other reviewing their integrations and separations. The findings showed differences in the CEO and Chairman's turnovers, depending on whether the leadership structure is independent or dual. These interpretations provided additional support for the RDT view that leadership structure power relates to the CEO turnover. Later on, another study showed

that the CEO turnover's sensibility to firm performance was significantly lower when the leadership structure was dual (Goyal & Park, 2002). For those authors, these findings suggested that the lack of independent leadership structures would relate to the difficulty for the board to remove poorly performing managers. Following that study, further research developed a longitudinal study of CEO turnover's antecedents followed by inside succession (Shen & Cannella, 2002). These authors highlighted interest conflicts and the competition within top management. More specifically, the evidence showed that non-CEO senior executives frequently played the leading role in CEO turnover. However, many CEOs in their sample only relinquished the CEO position at an advanced age. Not only that, but they also kept directorship or the Chairman title until retirement.

Despite the above, Davidson III et al., 2008 focused on succession and showed that CEO turnover by firing the old CEO, or succeeding an external CEO, or a designated non-heir, increases the likelihood of a dual leadership structure. In particular, these authors found that the likelihood of a dual structure was more significant than the independent one due to CEO turnover. Moreover, it has been shown that after a CEO turnover, the former CEO is retained on the board for a long time, calling it the "Retention Light" (Evans et al., 2010). Under the RDT approach, firms could benefit from the "Retention Light" because former CEOs can advise the current team. In contrast, under an agency theory view, the former CEO could exploit that position for personal benefits. The empirical findings showed that when prior firm performance was better, CEO turnover increased the likelihood of an independent leadership structures by retaining the former CEO as a member or Chairman. Nevertheless, the findings also showed that firms with "Retention Light" are more likely to choose a CEO successor with weaker bargaining power.

Likewise, other researchers show that a lower turnover could mean more significant tenure and a positive effect on CEO-Chairman duality (Linck et al., 2008). In contrast, when CEOs have

shorter tenures and lower ownership, this would increase the likelihood of having outside and independent leadership structures (Balsam et al., 2016). These lower CEO turnover levels are often due to CEOs' experience and tenure, which seek to share their knowledge within the firm. This last result is not new: several studies have already mentioned that maintaining a dual leadership structure with non-complex firms during turbulent external conditions allows an optimal firm performance (Boyd, 1995).

Additionally, from an Institutional perspective (Greenwood et al., 2014; Scott, 1995; Williamson, 2000), the Ibero-American region consisting of countries with shared normative, cultural and historical backgrounds, may exhibit specific tendencies and preferences for leadership structures (Aguilera & Jackson, 2010). Although by law, Colombia and Chile do not allow the CEO-Chairman duality, understanding the local context of the other Pacific Alliance countries and Spain is important when analyzing CEO turnover and its impact on changes in leadership structure. If there is an external institutional dimension (i.e., WGI) that favors a preference for a unified or split leadership approach, the likelihood of dual or independent leadership structures could be higher. Hence, we state the following hypotheses:

> *H3a: The likelihood of changing to an independent leadership structure (CEO-Chairman split) in an Ibero-American listed firm, influenced by the CEO turnover, is negatively moderated by the external institutional dimension.*

> *H3b: The likelihood of changing to an independent leadership structure (CEO-Chairman duality) in an Ibero-American listed firm, influenced by the CEO turnover, is positively moderated by the external institutional dimension.*

3.   Method

The research design is a causal longitudinal non-experimental study. Following previous studies (Schiehll & Martins, 2016), Figure 1 describes the model with three moderations of the external institutional dimension (WGI) on the relationship from the corporate governance internal mechanisms to both leadership structures.

Figure 3.1. Model
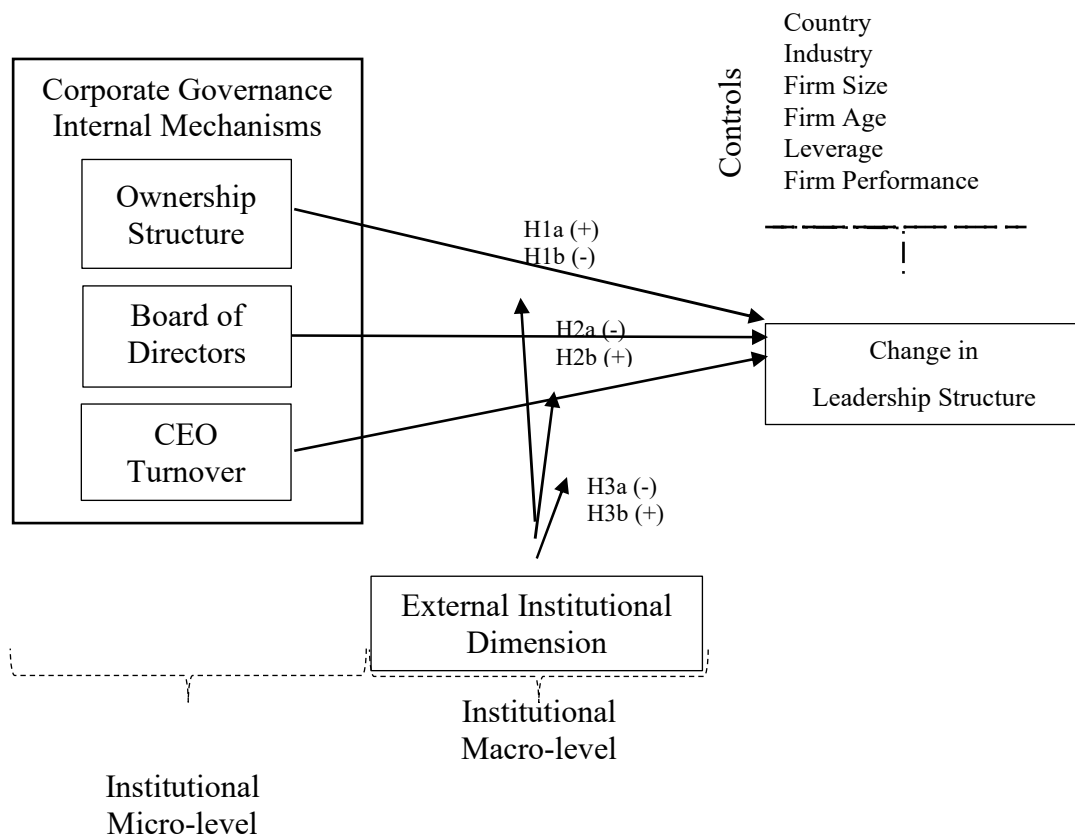
3.1.   Sample

The sample contains 2154 firm-year observations of a panel-data from 2009 to 2015. Initially, the study considered the Ibero-American countries from the Pacific Alliance and Spain. Regarding Pacific Alliance, the listed firms are in the Latin American Integrated Market - MILA, while Spanish firms are in the IBEX, accomplishing an Ibero-American regional space.

Due to the stock market regulations in Chile and Colombia where firms can only have independent leadership structures (i.e., CEO-Chairman split), the main analyses will be finally tested with three countries: Mexico, Peru, and Spain.

The sample includes the largest locally created firms listed on the three countries' stock exchanges (Table 3.1. Data Set. Data on the boards of directors come from the annual reports that each firm provides to the securities exchange regulator and each country's stock exchange market. Besides, data related to the accounting and market information come from the Bloomberg Terminal, Eikon Thompson Reuters platforms, and the audited financial statements offered by each country's securities exchange regulators.

Table 3.1. Data Set

Country	WGI	Leadership Structure	2009	2010	2011	2012	2013	2014	2015	Total
Chile	**1.37**	Independent	78	78	78	78	78	78	78	546
		Intermediate	0	0	0	0	0	0	0	0
		Dual	0	0	0	0	0	0	0	0
Colombia	**-1.02**	Independent	21	21	21	21	21	21	21	147
		Intermediate	0	0	0	0	0	0	0	0
		Dual	0	0	0	0	0	0	0	0
Peru	**-0.84**	Independent	53	50	59	56	60	60	61	399
		Intermediate	32	34	28	31	29	27	28	209
		Dual	14	15	12	12	10	12	10	85
Mexico	**-0.72**	Independent	14	15	14	15	12	13	16	99
		Intermediate	26	26	28	29	30	28	26	193
		Dual	22	21	20	18	20	21	20	142
Spain	**0.87**	Independent	4	7	6	5	5	4	6	37
		Intermediate	17	16	20	20	20	23	22	138
		Dual	22	23	23	23	23	21	21	156
Total		Independent	170	171	178	175	176	176	182	1228
		Intermediate	75	76	76	80	79	78	76	540
		Dual	58	59	55	53	53	54	51	383

Source: Own elaboration

3.2. Variables and measures

The **dependent variables** come from the leadership structure, which has two dummy variables: Independent (i.e., CEO-Chairman split) or otherwise, and Dual (i.e., CEO-Chairman duality) or otherwise. An intermediate category (the CEO is a member of the board but not the Chairman)

was not finally considered in this study. Thus, the study focuses mainly on independent and dual structures for demonstrating the control role and the strategic-service role.

Independent leadership structures would be a good representation of the leadership structure control role since there is explicit CEO-Chairman split. The CEO's absence as a board member allows the board of directors and its members to carry out a more independent CEO monitoring. On the other hand, CEO-Chairman duality ends up being the central representation of the leadership structure service-strategic role, since the CEO-Chairman positions belong to the same person, allowing governance and managerial advisory.

The **independent variables** are, from a micro-level institutional perspective (Dalton & Dalton, 2011; Williamson, 2000), the internal corporate governance mechanisms related to the ownership structure, the board of directors, and the CEO.

Regarding the ownership structure, we consider the participation of the largest shareholder. Related to the board of directors, we use board independence as the proportion of independent members, external to management, within the board. Also, regarding executive management, the independent variable is CEO turnover. This variable shows the CEO changes during the previous period. The boards constantly review CEO changes, at least formally. There is research regarding the possible causes and effects of CEO turnover. Thus, while the CEO turnover may respond to a natural or voluntary retirement process, there are also circumstances in which the CEO turnover is the owners' reaction to poor firm performance.

Additionally, from a macro-level institutional perspective (Greenwood et al., 2014; Scott, 1995), we consider using external governance forces that firms could perceive as institutional pressure. Here, our independent variable is the worldwide governance index (Kaufmann et al., 2011). Six main variables represent this index, and due to the high correlation among them, we have factorized them to obtain a single macro-level institutional dimension (WGI). This external institutional dimension represented by the WGI, globally ranges from -1.5 to +1.5, where,

according to our study, the values are positive for Chile and Spain. In contrast, Colombia, Mexico, and Peru indexes are negative. Thus, we consider that the WGI is an important macro-level institutional dimension that allows us to show the micro-level reaction (mainly from the firms' corporate governance internal mechanisms) through interaction, which translates into governance architectures.

Concerning **control variables**, the model includes firm performance and variables such as industry, country, and years. We use both accounting (ROA) and market (Tobin's Q) firm performances. Another variable is the board size. This variable tries to control the effect of internal corporate governance mechanisms, mainly board independence, on the changes in leadership structure. Other variables are firm leverage, firm size (measured as the natural logarithm of total assets), and firm age as the natural logarithm of firm's age.

Finally, the model uses categorical variables related to firms' industry and country. The international standard industrial classification (SIC) controls sectors as Agriculture, Forestry and Fishing (0100-0999); Mining (1000-1499); Construction (1500-1799); Manufacturing (2000-3999); Transportation, Communications, Electric, Gas and Sanitary service (4000-4999); Retail Trade (5200-5999) and Finance, Insurance and Real Estate (6000-6799). Also, a category per country controls the firms of Chile, Peru, Mexico, Colombia, and Spain.

3.3. Statistical model

The analysis includes a descriptive summary, differences in means, correlations, and two model groups of panel data regressions. Because the two dependent variables are dichotomous, we develop binary choice panel data models with probit regressions to test our theory and the hypotheses (Wooldridge, 2010). Regarding that, for each firm i and annual period t, we have a binary result y_{it}. If t represents one year, then it would indicate the likelihood of having a firm i with a certain BLS, $P(y_{it} = 1 \mid \mathbf{x}_{it}) = \Phi(\mathbf{x}_{it}\,\theta_o)$, where y is the dependent variable and $\mathbf{x}$ is a vector of independent and control variables (including controls for firm, industry, country, and year).

We start from the latent model: $y^*_{it} = x_{it} \theta_o + e_{it}$, where $y_{it} = 1[y^*_{it} > 0]$, θ is a 1 x K vector of parameters, and $e_{it} \mid x_{it} \sim$ Normal $(0,1)$.

$BoardLeadershipStructure^*_{it} = \beta_1 TopOwnership_{it-1} + \beta_2 BoardIndependence_{it-1} + \beta_3 CEOturnover_{it-1} + \beta_4 WGI_{it-1} + \beta_5 FirmPerformance_{it-1} + \beta_6 BoardSize_{it-1} + \beta_7 Leverage_{it-1} + \beta_8 FirmSize_{it-1} + \beta_9 FirmAge_{it-1} + \eta_1 Industry_{it} + \eta_2 Country_{it} + \eta_3 Years_{it} + e_{it}$

This function $y_{it} = 1[y^*_{it} > 0]$ becomes 1, as long as the statement is true, and 0 otherwise. Because e_i is normally distributed, it is irrelevant whether the inequality is strict or not in the equation. Therefore, we can easily obtain the distribution of y_{it} given x_{it}, P $(y_{it} = 1 \mid x_{it})$ = P $(y^*_{it} > 0 \mid x_{it})$ = P $(x_{it} \theta_o + e_{it} > 0 \mid x_{it})$ = P $(e_{it} > - x_{it} \theta_o \mid x_{it})$ = 1 - Φ $(-x_{it} \theta_o)$ = Φ $(x_{it} \theta_o)$, where Φ denotes the cumulative distribution function of the standard normal.

We propose two model groups with each dependent variable based on the latent model. First, a group on the likelihood of firms with a CEO-Chairman split (Independent). Second, a group on the likelihood of firms with CEO-Chairman duality (Dual). We analyze four models in each group. The first is the latent model without interactions. Then, we introduce three models where each corporate governance internal mechanism interacts with the external institutional dimension (WGI).

4.   Results

Table 4.1 shows the **descriptive analysis** with the **differences in means** of changes in leadership structure. The **correlation analysis** considers Mexico, Peru, and Spain (Table 4.2) because, as mentioned above, Chile and Colombia have legally restricted the presence of CEOs on the Boards. Based on the two leadership structures (dual and independent), these variables have significant correlations (Sig. < 0.05) with the other variables except with the variables of firm performance and firm age.

Table 4.1. Summary by Board Leadership Structure

Variable	Independent leadership structure (N=535)		Otherwise (N=920)		Differences in Means (N=1455)		Dual leadership Structure (N=383)		Otherwise (N=1072)		Differences in Means (N=1455)	
	mean	s.d.	mean	s.d.	t-test	s.d.	mean	s.d.	mean	s.d.	t-test	s.d.
WGI_{t-1}	-0.70	[0.02]	-0.26	[0.03]	**-0.440***	**[0.036]**	-0.1	[0.04]	-0.53	[0.02]	**0.432***	**[0.040]**
Top Ownership	0.63	[0.01]	0.57	[0.01]	**0.066***	**[0.015]**	0.51	[0.01]	0.62	[0.01]	**-0.108***	**[0.016]**
Board Independence	0.33	[0.01]	0.37	[0.01]	**-0.034***	**[0.013]**	0.39	[0.01]	0.34	[0.01]	**0.046***	**[0.014]**
CEO Turnover	0.16	[0.02]	0.08	[0.01]	**0.081***	**[0.017]**	0.07	[0.01]	0.13	[0.01]	**-0.063***	**[0.019]**
Board Size (ln)	2.02	[0.02]	2.30	[0.01]	**-0.273***	**[0.024]**	2.35	[0.02]	2.14	[0.01]	**0.213***	**[0.027]**
Leverage	0.68	[0.06]	1.27	[0.08]	**-0.593***	**[0.119]**	1.27	[0.14]	0.98	[0.06]	**0.289**	**[0.132]**
Total Assets (ln)	6.60	[0.07]	7.91	[0.07]	**-1.304***	**[0.108]**	8.16	[0.11]	7.16	[0.06]	**0.994***	**[0.122]**
Firm Age (ln)	3.44	[0.04]	3.30	[0.03]	**0.136***	**[0.047]**	3.34	[0.04]	3.36	[0.03]	-0.022	[0.051]
ROA	0.05	[0.00]	0.05	[0.00]	0.001	[0.004]	0.04	[0.00]	0.05	[0.00]	**-0.011**	**[0.004]**
Tobin's Q	0.86	[0.05]	0.88	[0.05]	-0.02	[0.076]	0.81	[0.06]	0.89	[0.04]	-0.082	[0.082]

Significance levels are boldfaced at * p<0.05, ** p<0.01, *** p<0.001. Standard errors of t-test in brackets.
The sample includes all firm-year observations with the variations of board leadership structures in MILA (Mexico, Peru) & IBEX (Spain) from 2009 to 2015.
According to their Corporate Governance Norms, Chile and Colombia are not included because they only have one Board Leadership Structure.

Table 4.2. Correlation Analysis (2009–2015)

N=1110	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Independent BLS	1.0000											
(2) Dual BLS	**-0.4553***	1.0000										
(3) Largest Shareholder$_{t-1}$	**0.1001***	**-0.1546***	1.0000									
(4) Board Independence$_{t-1}$	**-0.0933**	**0.0792**	**-0.2123***	1.0000								
(5) CEO Turnover$_{t-1}$	**0.1368***	**-0.0894**	**0.0690***	-0.0211	1.0000							
(6) WGI$_{t-1}$	**-0.2886***	**0.2665***	**-0.1775***	**0.1547***	-0.0463	1.0000						
(7) Board Size (ln)$_{t-1}$	**-0.2932***	**0.2013***	**-0.3551***	**0.2778***	**-0.0668***	**0.4923***	1.0000					
(8) Leverage$_{t-1}$	**-0.1407***	**0.0642***	**-0.1352***	**0.0927**	-0.0140	**0.2091***	**0.2019***	1.0000				
(9) Total Assets (ln)$_{t-1}$	**-0.3338***	**0.2119***	**-0.1940***	**0.3124***	-0.0486	**0.6084***	**0.6707***	**0.3027***	1.0000			
(10) Firm Age (ln)$_{t-1}$	**0.0710***	-0.0484	**-0.1362***	-0.0465	0.0443	0.0325	**0.1085***	-0.0260	0.0201	1.0000		
(11) ROA$_{t-1}$	0.0111	-0.0395	**0.1018***	**-0.1812***	-0.0490	**-0.1390***	**-0.1299***	**-0.1861***	**-0.1958***	0.0522	1.0000	
(12) Tobin's Q$_{t-1}$	0.0008	-0.0133	-0.0362	**-0.0853**	-0.0103	-0.0326	**-0.0786**	**-0.1451***	**-0.2061***	0.0367	**0.2384***	1.0000

Notes. This Table reports mean, s.d., min, max, and Pearson pair-wise correlation matrix. Bold texts indicate statistically significant at * p<0.05, ** p<0.01, *** p<0.001.
The sample includes all firm-year observations with the variations of board leadership structures in MILA (Mexico, Peru) & IBEX (Spain) from 2009 to 2015.
According to their Corporate Governance Norms, Chile and Colombia are not included because they only have one Board Leadership Structure.

On the other hand, Table 4.3 and Table 4.4 show the **marginal effects of binary choice models**. Regarding the first group (CEO-Chairman split /independent leadership structures) in Table 4.3, the variables that increase the likelihood of changing to firms with this leadership structure are Board independence, CEO turnover, and WGI. According to the vigilant board vision (Finkelstein & D'Aveni, 1994) and the control role, as board independence increases, the higher the likelihood of changing to firms with an independent leadership structure. Likewise, and regarding CEO turnover, the evidence suggests that the likelihood of changing to firms with independent leadership structures are consequences of the board's power of replacing the CEO (Goyal & Park, 2002). Additionally, the evidence shows that higher WGI values, as a macro-level institutional dimension, will increase the likelihood of changing to firms with independent leadership structures. Concerning control variables, firm size reduces the likelihood of changing to firms with independent leadership structures. In fact, the economic literature suggests that boards prefer to have their CEOs closer when firms reduce their size. These latter arguments give rise to explain the following group.

Regarding the second group (that is, dual leadership structure) in Table 4.4, CEO turnover's marginal effect reduces the likelihood of changing to firms with this leadership structure. This result finds theoretical support in the RDT approach that suggests that lower levels of CEO turnover relate to firms with a dual leadership structure. Due to the CEO's power and legitimacy, firms will have a more challenging time replacing their CEOs (Goyal & Park, 2002). The literature also offers some thoughts on the low level of CEO turnovers in young firms, where the CEO is also typically the founder (Daily & Dalton, 1993).

Table 4.3. Likelihood on Independent Leadership Structure (Control Role)

	DV: Independent LS=1, otherwise=0			
	base	H1a	H2a	H3a
Moderator Variables				
Largest Shareholder$_{t-1}$ x WGI$_{t-1}$		1.452		
		(1.40)		
Board Independence$_{t-1}$ x WGI$_{t-1}$			-2.536*	
			(-1.90)	
CEO Turnover$_{t-1}$ x WGI$_{t-1}$				-1.230*
				(-1.79)
Independent Variables				
Largest Shareholder $_{t-1}$	0.358	0.786	0.358	0.316
	(0.43)	(0.87)	(0.42)	(0.38)
Board Independence $_{t-1}$	**1.551***	**1.585***	0.267	**1.551***
	(1.89)	**(1.93)**	(0.25)	**(1.90)**
CEO Turnover $_{t-1}$	**0.767***	**0.763***	**0.763***	-0.008
	(2.97)	**(2.95)**	**(2.91)**	(-0.01)
WGI $_{t-1}$	**2.825**	1.922	**3.719**	**2.881**
	(2.02)	(1.24)	**(2.48)**	**(2.06)**
Control Variables				
ROA $_{t-1}$	-3.032	-3.051	-2.866	**-3.476***
	(-1.45)	(-1.49)	(-1.35)	**(-1.65)**
Tobin's Q $_{t-1}$	-0.241	**-0.240***	**-0.274***	-0.233
	(-1.64)	**(-1.67)**	**(-1.84)**	(-1.57)
Board Size (ln) $_{t-1}$	0.225	0.160	0.043	0.236
	(0.34)	(0.24)	(0.06)	(0.36)
Leverage $_{t-1}$	-0.023	-0.024	-0.021	-0.023
	(-0.46)	(-0.47)	(-0.43)	(-0.46)
Total Assets (ln) $_{t-1}$	**-0.367**	**-0.368**	**-0.364***	**-0.386**
	(-2.06)	**(-2.06)**	**(-1.96)**	**(-2.19)**
Firm Age (ln) $_{t-1}$	0.378	0.384	0.429	0.379
	(1.15)	(1.16)	(1.20)	(1.18)
Fixed Effects				
Industries	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes
N	1110	1110	1110	1110
Number of groups	195	195	195	195
Log likelihood	-331.120	-330.263	-329.398	-328.781
Wald χ^2	93.463	92.171	100.107	103.185
Wald test (p-value)	0.000	0.000	0.000	0.000
ρ	0.930	0.930	0.937	0.931
σv	3.652	3.631	3.852	3.670
LR χ^2	523.622	525.334	524.122	524.581
LR χ^2 test (p-value)	0.000	0.000	0.000	0.000

Random-effects probit regression. Random effects $u_i \sim$ Gaussian.
Integration method: Mean–Variance Adaptive Gauss–Hermite Quadrature.
Marginal effects; t statistics in parentheses.
The LR $\chi2$ test is recommended if the Wald $\chi2$ test does not converge because the sample size is small to moderate. * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 4.4. Likelihood on Dual Leadership Structure (Service-Strategic Role)

	DV: Dual LS=1, otherwise=0			
	base	H1b	H2b	H3b
Moderator Variables				
Largest Shareholder$_{t-1}$ x WGI$_{t-1}$		**-2.211***		
		(-1.95)		
Board Independence$_{t-1}$ x WGI$_{t-1}$			0.420	
			(0.32)	
CEO Turnover$_{t-1}$ x WGI$_{t-1}$				0.305
				(0.84)
Independent Variables				
Largest Shareholder $_{t-1}$	-0.562	-0.663	-0.564	-0.657
	(-0.65)	(-0.71)	(-0.65)	(-0.73)
Board Independence $_{t-1}$	1.022	1.130	1.159	0.973
	(1.12)	(1.20)	(1.06)	(1.04)
CEO Turnover $_{t-1}$	**-0.460***	-0.415	**-0.463***	-0.388
	(-1.65)	(-1.48)	**(-1.66)**	(-1.31)
WGI $_{t-1}$	-0.485	0.765	-0.603	-0.407
	(-0.32)	(0.46)	(-0.38)	(-0.27)
Control Variables				
ROA $_{t-1}$	1.660	1.688	1.642	1.788
	(0.86)	(0.84)	(0.85)	(0.92)
Tobin's Q $_{t-1}$	0.080	0.099	0.083	0.080
	(0.58)	(0.69)	(0.61)	(0.59)
Board Size (ln) $_{t-1}$	-0.111	-0.044	-0.068	-0.124
	(-0.17)	(-0.07)	(-0.10)	(-0.18)
Leverage $_{t-1}$	0.001	0.007	0.002	0.004
	(0.02)	(0.12)	(0.03)	(0.07)
Total Assets (ln) $_{t-1}$	-0.007	-0.008	-0.011	-0.004
	(-0.04)	(-0.05)	(-0.06)	(-0.02)
Firm Age (ln) $_{t-1}$	**-0.636***	-0.615	**-0.634***	-0.666
	(-1.65)	(-1.53)	**(-1.65)**	(-1.59)
Fixed Effects				
Industries	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes
N	1110	1110	1110	1110
Number of groups	195	195	195	195
Log likelihood	-299.108	-296.935	-299.054	-299.053
Wald χ^2	31.069	31.450	32.159	32.878
Wald test (p-value)	0.121	0.141	0.123	0.107
ρ	0.937	0.940	0.937	0.938
σv	3.856	3.967	3.865	3.881
LR χ^2	523.767	527.131	523.636	520.461
LR χ^2 test (p-value)	0.000	0.000	0.000	0.000

Random-effects probit regression. Random effects u_i ~ Gaussian.
Integration method: Mean–Variance Adaptive Gauss–Hermite Quadrature.
Marginal effects; t statistics in parentheses.
The LR $\chi2$ test is recommended if the Wald χ^2 test does not converge because the sample size is small to moderate. * $p<0.1$, ** $p<0.05$, *** $p<0.01$

4.1.   Largest shareholder and external institutional dimension

According to the first group (independent leadership structure) in Table 4.3, the interaction between the WGI and the largest shareholder shows no significant marginal effect in increasing the likelihood of changing to firms with independent leadership structures. Furthermore, the variable WGI is not directly significant either, so we could infer that, after the financial crisis, the largest shareholders have not perceived the external institutional dimension as an institutional pressure that drives them to increase the likelihood of changing to firms with independent leadership structures. Therefore, **hypothesis H1a is rejected**.

Concerning the second group (dual leadership structure) in Table 4.4, the evidence shows that the interaction between WGI and the largest shareholder reduces the likelihood of changing to firms with a dual leadership structure. This result would suggest that, after the financial crisis, the largest owners react to the institutional environment, showing a reduced likelihood of changing the leadership structure. Indeed, the reduced likelihood of changing to a dual leadership structure reflects the alignment of the largest owners with the regional corporate governance norms. In some Ibero-American countries, CEO duality may be more widely accepted and considered a standard practice. However, the largest shareholders may prioritize conforming to regional norms (i.e., Chile and Colombia) to maintain harmony and alignment with Ibero-American corporate governance expectations.

The largest owners may prioritize maintaining stability and avoiding disruptions during a period of change in leadership structures. Retaining the existing leadership structure, can provide a sense of continuity and minimize potential uncertainties associated with a leadership transition. Therefore, **hypothesis H1b is supported**.

4.2. Board independence and external institutional dimension

We analyze a second interaction on independent leadership structure, see Table 4.3, between the variables WGI and board independence. For the first group (independent leadership structure), the evidence shows, in a post-financial crisis context and under external institutional pressures, a significant marginal effect at reducing the likelihood of changing to independent leadership structures. Boards may perceive that independent leadership structures would have limited effectiveness in a complex institutional environment where regulatory oversight and enforcement could be lacking. They may prioritize maintaining the existing structures that are more aligned with the prevailing practices and norms, as they provide a sense of stability and familiarity. Indeed, civil law systems in Ibero-America often lead to the emergence of informal governance mechanisms and networks. Therefore, boards in Ibero-American listed firms could rely more on these mechanisms. These informal networks, such as family connections, personal relationships, and social capital, may play a significant role in decision-making and governance practices. Boards may perceive these mechanisms as more effective in achieving their objectives and maintaining control, leading to a reduced likelihood of changing to independent leadership structures. Therefore, **hypothesis H2a is supported**.

Regarding the second group (dual leadership structure) in Table 4.4, the interaction of the variables WGI and board independence has no significant marginal effect in increasing the likelihood of changing to firms with a dual leadership structure. This finding suggests that these firms did not consider the institutional environment in a post-crisis context. Boards also ignored these external pressures, thus nullifying the increase in the likelihood of changing to firms with a dual leadership structure. Therefore, **hypothesis H2b is rejected.**

4.3.   CEO turnover and the external institutional dimension

The third interaction on independent leadership structure, see Table 4.3, between the variables WGI and CEO turnover. The evidence shows a significant marginal effect for reducing the likelihood of changing to independent leadership structures in Ibero-American listed firms. From an institutional perspective, the governance architecture could be affected by institutional pressions due to the CEO turnover under a specific institutional environment, looking for another leadership structure. Likewise, institutional pressures stemming from CEO turnover under an Ibero-American institutional environment contribute to maintain continuity and stability during CEO transitions, leading to a preference for maintaining the existing leadership structure. The CEO turnover can trigger concerns about organizational disruption, and boards may perceive independent leadership structures as introducing additional uncertainties during these critical periods. The CEO turnover could reduce the likelihood of changing to independent leadership structures to meet stakeholder expectations for continuity and familiarity. Stakeholders may have developed relationships and trust based on the existing leadership structure, and a shift could be perceived as a departure from established norms and practices, potentially leading to resistance or concerns among stakeholders. Therefore, **hypothesis H3a is supported.**

Considering the second group of firms (dual leadership structure) in Table 4.4, the interaction between the variables WGI and CEO turnover has no significant marginal effect in terms of increasing the likelihood of changing to firms with a dual leadership structure. This finding could suggest that, in a post-crisis context, firms with a dual leadership structure underestimated external pressures, and those firms were not affected by CEO turnover. Likewise, under institutional interaction and governance architecture, these firms could opt for another kind of leadership structure. Therefore, **hypothesis H3b is rejected**.

Table 4.5. Likelihood on Independent **Leadership Structure (by Industry)**

	Finance, Insurance and Real Estate			
	DV: Independent LS			
	base	H1a	H2a	H3a
Moderator Variables				
Largest Shareholder$_{t-1}$ x WGI$_{t-1}$		2.194		
		(0.78)		
Board Independence$_{t-1}$ x WGI$_{t-1}$			-6.163*	
			(-1.70)	
CEO Turnover$_{t-1}$ x WGI$_{t-1}$				-37.496**
				(-2.33)
Independent Variables				
Largest Shareholder $_{t-1}$	**3.508***	**4.596***	2.791	**4.237****
	(1.65)	**(1.77)**	(1.35)	**(2.01)**
Board Independence $_{t-1}$	1.779	1.935	-1.361	1.847
	(0.94)	(1.02)	(-0.44)	(0.94)
CEO Turnover $_{t-1}$	**1.057***	**1.001***	**1.040***	**-27.807****
	(1.80)	**(1.71)**	**(1.76)**	**(-2.24)**
WGI $_{t-1}$	**7.623***	6.345	**9.731****	**9.625****
	(1.90)	(1.48)	**(2.30)**	**(2.36)**
Control Variables				
ROA $_{t-1}$	-5.500	-5.951	-3.316	-6.544
	(-0.69)	(-0.74)	(-0.42)	(-0.75)
Tobin's Q $_{t-1}$	0.683	0.696	0.658	0.942
	(0.85)	(0.87)	(0.81)	(1.10)
Board Size (ln) $_{t-1}$	**4.806***	**4.646***	**4.139***	**5.213***
	(2.83)	**(2.63)**	**(2.39)**	**(3.14)**
Leverage $_{t-1}$	-0.062	-0.058	-0.056	0.093
	(-0.95)	(-0.87)	(-0.83)	(0.85)
Total Assets (ln) $_{t-1}$	-0.323	-0.333	-0.260	-0.268
	(-0.86)	(-0.85)	(-0.65)	(-0.70)
Firm Age (ln) $_{t-1}$	-0.719	-0.682	-0.553	-0.712
	(-1.15)	(-1.07)	(-0.86)	(-1.13)
Fixed Effects				
Industries	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes
N	302	302	302	302
Number of groups	55	55	55	55
Log likelihood	-85.197	-84.884	-83.535	-81.210
Wald χ^2	53.524	49.332	57.617	64.410
Wald test (p-value)	0.000	0.000	0.000	0.000
ρ	0.967	0.967	0.969	0.972
σv	5.398	5.405	5.601	5.840
LR χ^2	126.530	127.102	129.615	126.025
LR χ^2 test (p-value)	0.000	0.000	0.000	0.000

Random-effects probit regression. Random effects $u_i \sim$ Gaussian.
Integration method: Mean–Variance Adaptive Gauss–Hermite Quadrature.
Marginal effects; t statistics in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$
The LR $\chi 2$ test is recommended if the Wald $\chi 2$ test does not converge because the sample size is small to moderate.

Table 4.6. Likelihood on Dual **Leadership Structure (by** Pacific Alliance **Countries)**

	Mexico and Peru			
	DV: Dual LS			
	base	H1b	H2b	H3b
Moderator Variables				
Largest Shareholder$_{t-1}$ x WGI$_{t-1}$		**-12.048****		
		(-2.36)		
Board Independence$_{t-1}$ x WGI$_{t-1}$			3.659	
			(0.69)	
CEO Turnover$_{t-1}$ x WGI$_{t-1}$				2.420
				(0.48)
Independent Variables				
Largest Shareholder $_{t-1}$	-0.516	**-9.969****	-0.507	-0.538
	(-0.46)	**(-2.36)**	(-0.45)	(-0.48)
Board Independence $_{t-1}$	1.396	1.363	4.284	1.399
	(1.38)	(1.33)	(0.98)	(1.39)
CEO Turnover $_{t-1}$	**-0.637***	-0.533	**-0.619***	1.219
	(-1.81)	(-1.51)	**(-1.75)**	(0.32)
WGI $_{t-1}$	-0.918	**6.106***	-2.262	-1.085
	(-0.52)	**(1.74)**	(-0.85)	(-0.60)
Control Variables				
ROA $_{t-1}$	3.215	3.477	3.184	3.264
	(1.34)	(1.41)	(1.32)	(1.36)
Tobin's Q $_{t-1}$	0.109	0.140	0.121	0.105
	(0.77)	(0.98)	(0.85)	(0.74)
Board Size (ln) $_{t-1}$	0.400	0.434	0.386	0.410
	(0.60)	(0.63)	(0.58)	(0.61)
Leverage $_{t-1}$	-0.018	-0.035	-0.022	-0.027
	(-0.18)	(-0.37)	(-0.21)	(-0.27)
Total Assets (ln) $_{t-1}$	-0.060	-0.033	-0.052	-0.062
	(-0.30)	(-0.16)	(-0.26)	(-0.31)
Firm Age (ln) $_{t-1}$	-0.559	-0.476	-0.538	-0.562
	(-1.38)	(-1.15)	(-1.33)	(-1.39)
Fixed Effects				
Industries	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes
N	859	859	859	859
Number of groups	150	150	150	150
Log likelihood	-209.645	-206.722	-209.424	-209.519
Wald χ^2	19.916	24.908	20.483	20.138
Wald test (p-value)	0.527	0.301	0.553	0.574
ρ	0.958	0.958	0.958	0.958
σv	4.754	4.751	4.782	4.756
LR χ^2	375.321	371.681	375.176	375.379
LR χ^2 test (p-value)	0.000	0.000	0.000	0.000

Random-effects probit regression. Random effects $u_i \sim$ Gaussian.
Integration method: Mean–Variance Adaptive Gauss–Hermite Quadrature.
Marginal effects; t statistics in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$
The LR $\chi 2$ test is recommended if the Wald $\chi 2$ test does not converge because the sample size is small to moderate.

5.   Robustness tests

Next, we present some robustness tests to show the consistency of our results using a comparative institutional analysis (Aguilera & Jackson, 2010) among industries and countries.

According to Table 4.5, and regarding hypotheses H2a and H3a, the test confirms the general results for Spain, Mexico, and Peru's financial, insurance, and real estate industries. The institutional logic (Greenwood et al., 2014) shows significant marginal effects of the interaction between WGI and the corporate governance internal mechanisms (i.e., board independence and CEO turnover). This interaction reduces the likelihood of changing to firms with independent leadership structures. Besides, Mexico and Peru (Table 4.6) show a significant marginal effect of the interaction between WGI and largest shareholders, reducing the likelihood of changing to firms with a dual leadership structure, thus giving strength to hypothesis H1b.

Additionally, the study shows details of the models in graphical mode to understand the behavior of the variables tested with a comparative institutional analysis. The external institutional dimension, a moderating variable represented by the WGI, globally ranges from -1.5 to +1.5. According to our study, the WGI values are positive for Chile and Spain. In contrast, Colombia, Mexico, and Peru indexes are negative. By working only with Spain, Mexico, and Peru because they have changes in their leadership structures, we have a representation of both the negative indexes (Mexico and Peru) and the positive indexes (Spain) that would interact with our relationships.

For the largest shareholder models (**¡Error! No se encuentra el origen de la referencia.**), the first graph shows non-significant variations between countries with negative WGI (Mexico and Peru) and the country with positive WGI (Spain), for the model with the

likelihood of changing to firms with independent leadership structures. At the same time, the second graph shows significant variations between countries with negative WGI (Mexico and Peru) and the country with positive WGI (Spain) for the model with the likelihood of changing to firms with dual leadership structures. According to this last result, on the one hand, there is a greater likelihood of changing to firms with a dual leadership structure due to a greater concentration of the largest shareholder, being affected by negative external institutional dimensions such as the case of Peru and Mexico. On the other hand, there is the likelihood of changing to firms with dual leadership structures due to a greater concentration of the largest shareholder, influenced by positive external institutional dimensions such as the case of Spain.

Figure 5.1. Leadership structure likelihood by largest shareholder and WGI
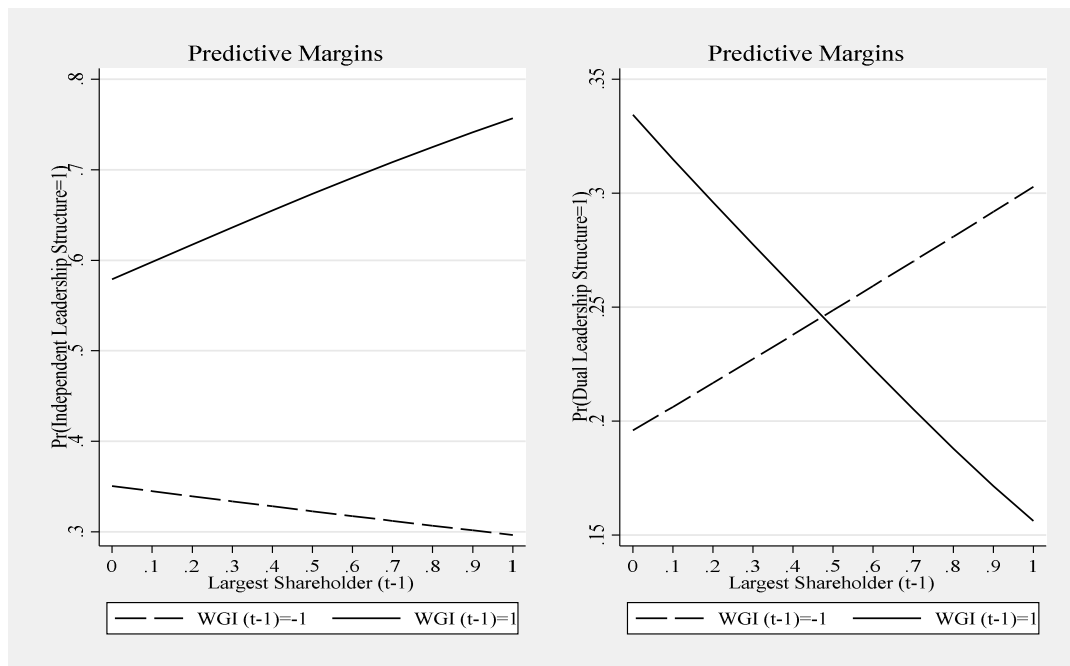
Source: Own elaboration

For the board independence models (**¡Error! No se encuentra el origen de la referencia.**), the first graph shows significant variations between countries with negative WGI (Mexico and Peru) when compared to the country with positive WGI (Spain) for the model with the

likelihood of changing to firms with independent leadership structures. In contrast, the second graph shows non-significant variations between countries with negative WGI (Mexico and Peru) and the country with positive WGI (Spain) when modelling the likelihood of changing to firms with dual leadership structures. According to the first result, on the one hand, there is a greater likelihood of changing to firms with independent leadership structures in the face of higher board independence being affected by negative external institutional dimensions, such as the case of Peru and Mexico. On the other hand, there is the likelihood of changing to firms with independent leadership structures due to higher board independence, influenced by positive external institutional dimensions such as the case of Spain. This would suggest more flexibility on the part of the boards of directors of listed companies in Spain, where there is no need to seek independent leadership structures due to positive external dimensions.

Figure 5.2. Leadership structure likelihood by board independence and WGI
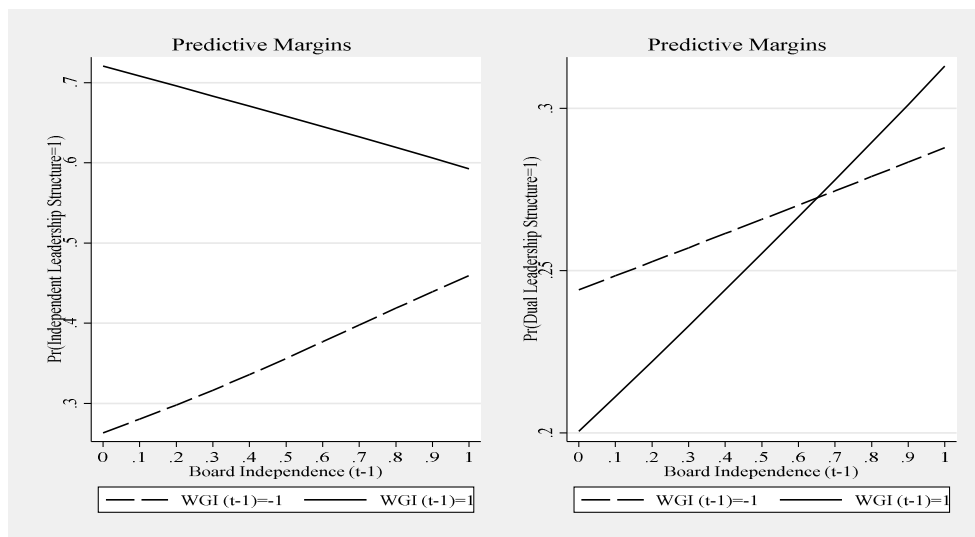
Source: Own elaboration

For the CEO turnover models (**¡Error! No se encuentra el origen de la referencia.**), the first and second graphs show significant and non-significant interactions similar to the board independence models. According to the first result, on the one hand, there is a greater

likelihood of changing to firms with independent leadership structures due to CEO turnover being affected by negative external institutional dimensions, such as in the case of Peru and Mexico. On the other hand, there is the likelihood of changing to firms with independent leadership structures in the face of CEO turnover, influenced by positive external institutional dimensions such as the case of Spain.

Figure 5.3. Leadership structure likelihood by CEO turnover and WGI
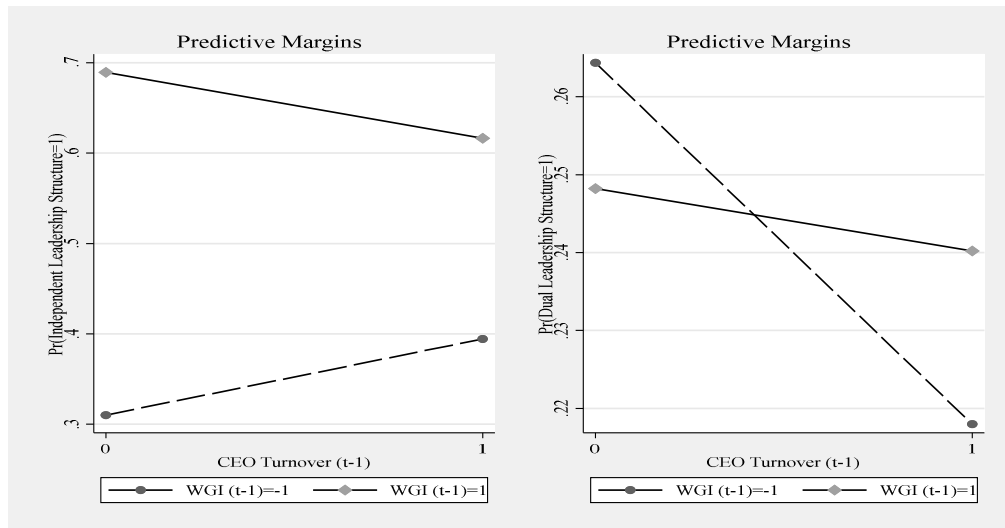
Source: Own elaboration

6.   Discussion

This study expands the literature about leadership structures (Krause et al., 2014). Following an institutional approach (Aguilera & Jackson, 2010; Scott, 1995; Williamson, 2000), we have studied the governance architecture through external institutional dimension. This approach establishes an agenda that allows deepening in both fields, multilevel studies, and emerging contexts.

Besides, this research focuses on Ibero-America after the 2008 financial crisis. We took advantage of the new integration efforts of the stock markets in Latin America (MILA) and its relationship with Spain (IBEX). MILA represents countries with the least volatility and some of the best country-risk indicators in Latin America. However, one limitation has been the existence of different regulations in Chile and Colombia, where CEOs cannot be board

members or the Chairman. Further, Latin American countries' corporate governance data comes from different sources and makes it harder to build a balanced data panel. As part of a future research agenda, the setting could expand, including both more years and firms, to better understand the Ibero-American industries' behavior in a post-COVID context.

Likewise, this study develops a binary panel data model, separating the hypotheses into two groups according to the two main dependent variables: the presence of independent leadership structures (that is, CEO-Chairman split) and the presence of a dual leadership structure (CEO-Chairman duality). There were few references for this technique with multilevel predictive variables and we have included logit and probit regressions, obtaining similar results.

Future research should expand the studies on how external institutional dimensions could affect the corporate governance dynamics of companies in Ibero-America. Indeed, the current variations in the stock markets and the changing policies of the countries could be conditioning relevant aspects that could influence the decisions to change leadership structures.

7.   Conclusions

In summary, this research seeks a new understanding of the changes in leadership structure through the notion of institutional complementarity, a consequence of the interaction between internal mechanisms of corporate governance (micro-level institutions) and external institutional dimension (a macro-level institutional factor) in an Ibero-American context during a post-crisis period. The literature review allows us to argue three hypotheses on the changes in leadership structure. Concerning the binary panel data, on the one hand, for the first group (Table 4) of firms with independent leadership structures (CEO-Chairman split), the interaction of WGI with the variable largest shareholder (H1a) does not have

support, while further interactions with the board independence (H2a), and with CEO turnover (H3a) are supported. On the other hand, for the second group of firms with dual leadership structure (CEO-Chairman duality), the interaction of WGI and the largest shareholder (H1b) is supported. However, the interactions with board independence (H2b) and CEO turnover (H3b) are rejected.

Finally, we carry out some robustness tests by industries (Table 4.5) and countries (Table 4.6), obtaining confirming evidence that gives consistency to the previous results. These results offer an opportunity to expand the institutional implications of having changes in the firm's board leadership structure.

Chapter 3. Ownership structures heterogeneity and IT investment growth in Ibero-America: An institutional approach after a crisis

1. Introduction

In recent decades, after each global crisis, firms' investment in information technology (IT) has grown back, becoming a strategic trending topic (Kappelman et al., 2020; Sabherwal et al., 2019) that also involves internal corporate governance mechanisms. This interest extends also to data from developing countries (Choi et al., 2012; Ho et al., 2017; Ning et al., 2019). Owing to this, several studies have conducted analyses to understand how these IT investments are governed through different organization's structures, processes, or relationships with strategic alignment (Henderson & Venkatraman, 1992; Peterson, 2004; Sambamurthy & Zmud, 1999; Weill & Ross, 2004). Indeed, different scholars have mentioned a close relationship between the agency problem and IT investments, proposing it as an alternative to reduce information asymmetry, as well as agency and transaction costs (Drnevich & Croson, 2013; Eisenhardt, 1989; Gurbaxani & Whang, 1991; Jensen & Meckling, 1976). Therefore, after each global crisis (e.g., early 90's recessions, the dot.com, the financial recession in 2008, and probably the Covid-19), the academic discussion has highlighted the need to reinforce the relationship between internal corporate governance mechanisms and IT investments through the highest-decision levels, such as ownership structures, (Andriole, 2009; Loh & Venkatraman, 1993; Nolan & Mcfarlan, 2005; Xue et al., 2021) and the determinants of IT investment under other developing contexts or perspectives (Drnevich & Croson, 2013; Rojko et al., 2011).

However, empirical studies on the impact of ownership structures (even more about their heterogeneity) on IT investment remain underdeveloped (Choi et al., 2012; Ho et al., 2011, 2017; Loh & Venkatraman, 1993; Ning et al., 2019; Ravichandran et al., 2009; Xue et al., 2021; Zhang & Huang, 2012). Moreover, the research in this field is specially scant on emerging or developing economies (Choi et al., 2012; Ho et al., 2011; Ning et al., 2019). This gap is attributed to the fact that researchers have studied traditional ownership structures in an independent way, such as the largest or family shareholders (Ho et al., 2017; Loh & Venkatraman, 1993; Ning et al., 2019), foreign shareholders (Choi et al., 2012; Ho et al., 2011) and institutional investors (Choi et al., 2012; Ravichandran et al., 2009; Xue et al., 2021). They show parallelly that, despite the governance convergence process, differences (i.e., heterogeneity) persist (Aguilera & Jackson, 2010; Hoskisson et al., 2002). Despite that gap, corporate governance scholars have studied the effect of ownership structure heterogeneity and the evolution of nascent institutional investors on developed capital markets (Bushee, 1998; Johnson & Greening, 1999; Porter, 1992) and have found an institutional investor type that has recently emerged in developed economies: the passive investment management firms with active shareholders (Appel et al., 2016; McCahery et al., 2016; Strampelli, 2018). More specifically, these institutional investors are referred to as quasi-indexers (Bushee et al., 2014; Chen et al., 2018) or common ownership (Azar et al., 2018; Connelly et al., 2019; Posner et al., 2017; Wang & Barrese, 2019). These firms (e.g., Fidelity, The Vanguard Group, State Street, and BlackRock) grow faster after crises and reconfigure new ownership structures through asset management as exchange-traded funds, showing common control with a high risk of possible oligopolist concentration effects that could trigger future crises (Azar & Vives, 2021; Wang & Barrese, 2019), expanding also to developing economies. Regarding this concern, a comparative institutional analysis (Aguilera & Jackson, 2010) would allow for the study of the traditional and new ownership

structure heterogeneity on IT investments in other institutional contexts. Considering the fact that the institutional rules of corporate ownerships in developed economies such as Europe and the US have been adopted by developing economies such as Ibero-America (La Porta et al., 1998, 2013), and that seminal studies on economic growth show that developing countries converge toward developed countries through technology investment (as it is cheaper than innovation (Barro & Sala-i-Martin, 1997; Romer, 1990)), Ibero-America becomes a "natural laboratory" to test this research gap (Aguinis et al., 2020). Therefore, owing to its promising nature, we use Ibero-America as a field to study ownership structure heterogeneity (Briano-Turrent & Rodríguez-Ariza, 2016; Kabbach de Castro et al., 2012; Saona & San Martín, 2018) and its relationship with IT investments (Hofman et al., 2016; Malaquias & Albertin, 2018).

More specifically, this study aims to examine how ownership heterogeneity affects the growth of IT investment in Ibero-American listed firms from an institutional comparative perspective. To achieve this goal, we have developed the following:

First, the study justifies the Ibero-American case through a comparative institutional framework (Aguilera & Jackson, 2010) related to corporate ownership and IT investments. After the global financial crisis, an institutional complementarity, referred to as the Pacific Alliance, emerged and promoted the first Latin American Integrated Market MILA, including Chile, Colombia, Mexico, and Peru (Blanco-Jiménez & Cruz Alvarez, 2019; Spillan & Virzi, 2017). This has become the most stable representation of the capital market in Ibero-America, along with the IBEX (Spain).

Second, this study addresses a literature review of the heterogeneity of ownership structures as an internal corporate governance mechanism and its relationship with IT investments. To achieve this, we focus on the first studies on this relationship with the largest concentrated

shareholder (Ho et al., 2017; Loh & Venkatraman, 1993), followed by the largest foreign shareholder (Choi et al., 2012; Ho et al., 2011), and the studies on institutional investors (Ning et al., 2019; Ravichandran et al., 2009; Xue et al., 2021) under an institutional perspective, adding the gap between common ownership and IT investment growth.

Third, the study develops a longitudinal research design using panel data from 2009 to 2015 and MILA- and IBEX-listed firms. The data of these contexts are obtained from Bloomberg, Eikon, and annual reports from each country's securities exchange regulators.

Fourth, regarding academic implications, our study seeks to enrich, from an institutional perspective, the evidence left by studies on independent ownership structures and IT investments (Drnevich & Croson, 2013), while considering the common ownership that has not been contemplated previously. Finally, and regarding practical implications, this study hopes to make contributions to both IT and management professionals, considering that the IT investment decisions are duties of the higher decision corporate levels, even in developing economies.

2.   An institutional framework in the case of Ibero-America

From a comparative institutional framework (Aguilera & Jackson, 2010), the tradition of property rights in Ibero-America differs from the Anglo-American common law, as Ibero-American countries adopted French civil law, which originates from the Roman Civil Code and the Napoleonic codes, incorporated in Latin American countries during the colonial era (Aguilera & Jackson, 2010; La Porta et al., 1998, 2013) and after the independence. Under this civil law tradition, Ibero-America created its corporate and capital market laws, providing weak protection for minority shareholders, limited ownership dispersion with high incentives to concentration, and internal financing coming from non-independent banks (Céspedes et al., 2010; Shleifer & Vishny, 1997). Indeed, owing to decades of protectionist

economic contexts, Ibero-American ownership structures show high concentration in the hands of large families or state owners (Chong & López-de-Silanes, 2007).

However, after the recession of the so-called Lost Decade of the 1980s for Latin America compared to a stronger integration of Spain into the European Union (Easterly, 2001), these countries divergently refocused their policies on the free market, incorporating suggestions — from supranational institutions such as the International Monetary Fund, the World Bank, the Economic Commission for Latin America and the Caribbean (ECLAC), or the Organization for Economic Cooperation and Development (OECD) — to carry out privatizations of state-owned enterprises (Chong & López-de-Silanes, 2007), moving to new private ownership structures, and encouraging foreign direct investment (e.g., Spanish firms such as BBVA, Santander, Mapfre, Telefónica, Repsol, among others, invested massively in Latin America). Moreover, the creation of insurance, pension, or mutual funds reconfigured the contexts, both in financial and non-financial terms, for local and foreign institutional investors (Lefort, 2005), and the largest shareholders of banks, further developed horizontal ownership schemes with offshore holdings, to create and promote these funds.

All these changes required greater transparency and accountability in Ibero-America, and the adoption of good corporate governance practices since the 90's (Schamann, 2015). Additionally, the creation of the European Union (1993) integrated the Iberian Peninsula countries toward their neighbors, thus helping Spain to reach the level of developed economies faster. Un this context, Spain adopted its 1996 Code of Good Corporate Governance, which was later consolidated by the OECD (1999) and adapted by countries such as Mexico (1999) and Peru (2001) (Aguilera and Cuervo-Cazurra, 2009). Likewise, Colombia and Chile modified their securities market laws during those decades, merging the codes with their laws in 2005 and 2012, respectively (Schamann, 2015). In addition, Mexico

(1994) and Chile (2010) were incorporated into the OECD (Briano-Turrent & Saavedra García, 2015), while Peru (2009) and Colombia (2013) formalized their applications.

However, owing to the complementary adoptions of the principles of corporate governance based on Anglo-American common laws such as the Cadbury Report (1992), or the Sarbanes-Oxley Act (2002), these countries incorporated mixed compliance schemes such as sanctions (hard law) and "comply or explain" (soft law), expanding the ownership structure heterogeneities (Aguilera & Jackson, 2010). These changes encouraged IT investments, more than innovation, as a key factor in productivity performance, maintaining similar growth trends between most important Latin American countries and those on the Iberian Peninsula (Hofman et al., 2016). Indeed, and considering economic growth studies, these developing countries would converge toward developed countries through the growth in technology investment (Barro & Sala-i-Martin, 1997; Romer, 1990), contributing to value creation in the same industries for twenty years (Hofman et al., 2016). This evidence validates the use of IT investment as an alternative to R&D investment in the context of developing countries. Likewise, recent regional findings show that listed firms with significant IT investments are related to the presence of institutional investors (Malaquias & Albertin, 2018).

From an institutional economic framework, the old agency theory's goal of separating ownership and control (Berle & Means, 1932) is expanded to get dispersed ownership structures through new shareholders from the developed capital markets, thus creating value for the firm and increasing investments, but also creating additional information asymmetries (Aguilera & Jackson, 2010; Jensen & Meckling, 1976). The (principal-agent approach), owing to this incentivized separation (e.g., the Anglo-American common law context), encourages the control role by independent boards or leadership structures.

However, in the institutional contexts of civil law, such as Ibero-America, firms tend to have ownership concentration and the largest shareholder (which usually includes family participation) prefers internal or bank debts, to prevent sharing ownership or losing control (Briano-Turrent & Rodríguez-Ariza, 2016; Céspedes et al., 2010; Galve-Górriz & Hernández-Trasobares, 2015). Additionally, when concentration allows some dispersion, despite pyramid schemes or dual-class shares, it refocuses information asymmetry in a principal-principal problem (largest vs. minority shareholders and debtholders) more than principal-agent problems, refocusing investments, and encouraging value creation for other stakeholders (Jara et al., 2019; Kabbach de Castro et al., 2012; Saona & San Martín, 2018).

Furthermore, after the global financial crisis (2008), the institutional complementarity of four countries with continuous growth in Latin America (in fact, Chile, Colombia, Mexico, and Peru, representing almost 50% of Latin American GDP) created the Pacific Alliance (PA) and the first Latin American integrated market, MILA, hence achieving stable and long-term ratings by the main credit rating agencies such as Standard & Poor's, Moody's, and Fitch (Blanco-Jiménez & Cruz Alvarez, 2019; Spillan & Virzi, 2017). For these reasons, MILA-listed firms are as relevant as IBEX-listed firms from Spain, in terms of showing the advances in ownership structures (Aguilera et al., 2019; Saona et al., 2020) that involve the largest concentrated, foreign, and institutional shareholders related to IT investments. Additionally, after the global financial crisis and the consolidation of pension funds and investment firms, new highly active investors, referred to as common ownership (Azar et al., 2018; Connelly et al., 2019; Posner et al., 2017), and with examples such as Blackrock, Fidelity, Vanguard, and State Street, quickly positioned themselves in the capital markets (Wang & Barrese, 2019), including IBEX and MILA. These apparent minority institutional investors have both significant presence and influence on the firm's investments (Yadav, 2018). Therefore, incorporating them into the study allows for a comparative understanding,

despite the traditional largest shareholder (concentrated, foreign, or institutional), shifting from a principal-agent problem to a dominant-minority shareholder focus (Cueto, 2013; Jara et al., 2019), and it also allows us to study how they could influence IT investments from MILA- and IBEX-listed firms.

3. Ownership structure heterogeneity and IT investment

Studies on ownership structures and IT began after the consolidation of the theory of the firm (Jensen & Meckling, 1976), as part of progress from the new institutional economics, where information or search costs and decision-making costs, based on computational costs, reinforced the understanding of information asymmetry as part of the principal-agent problem (Fama, 1980). The concern of this economic perspective allowed scholars to attempt to explain how IT investments grew, creating value for firms, so that these investments were then no longer exclusive decisions of the IT departments, but also responded to the highest-decision levels (Porter & Millar, 1985). This led to the proposition that these firms' IT were related to contracts based on behavior or objectives between the principal and the agent, reducing the vertical problem of information asymmetry (Eisenhardt, 1989).Owing to strategic IT investment, the owners of the firms could reduce both the internal coordination costs (agency costs) and the external coordination costs (transaction costs) significantly, as internal corporate governance mechanisms (Gurbaxani & Whang, 1991).

Hence, scholars began developing empirical studies about the effects of corporate ownership on IT investments. Therefore, the studies raised the alignment relationship between corporate and IT strategies (Henderson & Venkatraman, 1992), thus becoming the basis of IT governance studies (Loh & Venkatraman, 1992; Weill & Ross, 2004), and encouraging the first study on stock ownership structures (including large or insider shareholders) on IT

investments (Loh & Venkatraman, 1993). Based on the above, a relevant premise so far is that IT investments are considered long-term expenditures, because the resources going to hardware, software, personnel, consultancies, projects, among other budgets, are conditioned to progressive and long-term implementations. In fact, these implementations require the participation of the highest decision-making levels (internal corporate governance mechanisms) becoming relevant players in the investment decisions.

Empirical studies were resumed after the contexts of the dot.com and the global financial crises under an institutional perspective, focusing on the direct effect of institutional ownership on IT investments (Ravichandran et al., 2009). Likewise, under the agency theory, other studies show how internal corporate governance mechanisms, such as board independence and foreign ownership in the context of emerging markets (Ho et al., 2011), or governance indexes in ERP-adopting firms in the context of American markets (Zhang & Huang, 2012), moderate the return of IT investments. Alternatively, we also find a study using the agency and resource dependence theories to show the effects of institutional and foreign ownership on IT innovation performance in the context of Korean firms (Choi et al., 2012). Additionally, the institutional theory highlights the concentration of family ownership on IT under- or over-investment (Ho et al., 2017). More recently, under institutional and micro-foundation lenses, another study has addressed how family ownership heterogeneity influences IT investments in the context of Indian firms (Ning et al., 2019). Therefore, a comparative institutional framework is strengthened to integrate empirical research on how the heterogeneity of ownership structures influences the IT investment growth in different institutional contexts (such as French civil law countries), comparing developed and developing markets (such as IBEX and MILA).

3.1. Largest concentrated ownership and IT investments

In civil law institutional contexts such as Ibero-America, the level of concentration through the largest shareholder's participation is a relevant measure of the ownership structure; thus, the largest concentrated shareholder holds higher voting rights (Aguilera et al., 2019; Aguilera & Jackson, 2010; Kabbach de Castro et al., 2012). Indeed, in Latin America, the largest shareholder typically owns more than 50% of voting rights, while in Europe, although it does not exceed 50%, they hold more than 44% of voting rights, on average (Kabbach de Castro et al., 2012). This means that, although in countries such as Spain, the largest concentrated shareholder with voting rights in IBEX-listed firms presents a normal distribution across heterogeneous ownership structures, in countries such as the Pacific Alliance with MILA-listed firms, the distribution is asymmetric with a pro-blockholder bias. From a comparative institutional perspective (Aguilera & Jackson, 2010), this divergence could have opposite impacts depending on the institutional context – markets – where the listed firms are located.

This ownership concentration has two dissonant consequences (Saona and San Martín, 2018). First, the largest concentrated shareholder may have the power and incentives to enhance the firm value creation and control managerial behavior by reducing agency costs and provide incentives (Briano-Turrent & Saavedra García, 2015; Jara et al., 2019). This first consequence is also known as the monitoring hypothesis (Saona & San Martín, 2018) or agency problem solver (Saona et al., 2020), as long as we are in an institutional context with a high level of investor protection (Shleifer & Vishny, 1997). However, concentrated control can cause a principal-principal problem, if the largest concentrated shareholder enjoy private benefits at the expense of the dispersed minority or internal shareholders (Céspedes et al., 2010; Saona & San Martín, 2018). Therefore, the largest concentrated shareholder

would determine business strategies such as dividend policies, investments, capital allocation, and leverage, among others. This second consequence is also known as the expropriation hypothesis, where ownership concentration is an endogenous response to poor investor protection. Comparatively, this scenario is more common in Latin American firms (Saona & San Martín, 2018) than in Spain.

Despite the widely investigated monitoring role of the stock market through ownership structures (Aguilera & Crespi-Cladera, 2016), previous research on larger concentrated ownership from listed firms shows a conservative IT investment behavior if there is higher internal ownership (Loh & Venkatraman, 1993), or IT sub-investment if the concentrated ownership is family owned (Ho et al., 2017). These direct-effect studies in a developed common-law institutional context assumed that higher risks are positively related to high expected returns. However, those shareholders who are adversely affected by long-term risks related to IT investments will attempt to avoid uncertainty with significantly low IT investment. We assume that the largest owner of IBEX-listed firms may have similar behavior in relation to IT investment growth.

In contrast, a recent study on listed firms in an emerging market such as India, found a negative direct effect of concentrated family ownership on IT investment (Ning et al., 2019). Alternatively, a study on ownership structures and technological innovation performance with Korean listed firms showed that there were no significant direct effects of large concentrated ownership on technological innovation, suggesting that this ownership does not play a positive role in monitoring and controlling manager's investment behavior (Choi et al., 2012). These results seem to support the expropriation hypothesis, typical of the principal-principal problem, which is also reflected in Latin America. Therefore, we assume

that the largest concentrated ownership of MILA-listed firms may have a similar behavior in relation to IT investment growth. Thus, we propose the following hypothesis:

Hypothesis 1. *The effects of the largest concentrated shareholder on IT investment growth are more negative among MILA-listed firms than among IBEX-listed firms.*

3.2.   Largest foreign ownership and IT investments

Large foreign ownerships are driven by the knowledge of foreign investors to catapult income in international markets, giving the local firms in comparative institutional contexts (Aguilera & Jackson, 2010), such as Ibero-America, "better access to superior technical, administrative and financial resources" (Choi et al., 2012; Douma et al., 2006; Ho et al., 2011). Indeed, large foreign ownership tends to have longer investment horizons than individual local investors, which decreases stock turnover, raises information acquisition, and is highly valued by local firms (Huang & Shiu, 2009).

A large foreign owner (e.g., multinational firms, business groups, or holding firms) focuses on foreign markets, especially when the investment is related to their business activity and requires technological competitive advantages (Chang et al., 2006; Choi et al., 2012). Therefore, these multinational firms, business groups, or holding firms will invest in the technology for local firms when they are the largest shareholders. Thus, large foreign shareholders will encourage IT investment in local firms by transferring advanced technological resources, pressuring local owners to invest in IT more, even using part of their shares (Chang et al., 2006).

Indeed, an empirical study showed that large foreign shareholders played a positive role in seeking improvements in the corporate governance of firms from developing countries, a fact which affects investment in technological innovation significantly, especially after the

financial crisis (Choi et al., 2012). Hence, foreign ownership can help firms invest and deploy IT more effectively. Empirical research shows that the largest foreign ownership benefits IT investments of small rather than large firms in emerging markets, facilitating technology transfer and positioning local small firms to benefit from IT knowledge (Ho et al., 2011).

However, the same research suggests that previous studies are not entirely conclusive when they recognize that foreigners are not familiar with the institutional context (Ho et al., 2011). Therefore, their participation would not benefit the local firm significantly, owing to their limited knowledge of local — both formal and informal — institutions. Nevertheless, and as a consequence of principal-agent problems, the largest foreign shareholders are, relative to local shareholders, in a better position to exploit their advantages when the countries have stronger shareholder protection rights and judicial systems, government incentives, and higher levels of economic development, to attract higher levels of foreign capital (Aggarwal et al., 2005). Therefore, we consider that the largest foreign ownership of IBEX-listed firms may have similar behavior in relation to IT investment growth.

In contrast, there are claims related to the principal-principal problem in developing economies, where domestic investors, such as the largest shareholders, could establish overseas firms registered as foreign investment firms, and further use them to invest in their local stock markets. This expropriation problem is severe for small firms, as they are more illiquid and attract less public scrutiny, or where shareholder protection rights and judicial systems are weak. In the case where seemingly genuine foreign ownership affects local firms, they should show a positive relationship between foreign ownership and value creation, as local firms lack the foreigners' know-how and resources (Huang & Shiu, 2009), which can affect IT investments negatively. In addition, based on the comparative corporate

governance and Latin America literature (Aguilera et al., 2019; Kabbach de Castro et al., 2012), we assume that foreign shareholders in MILA could make IT investments more conservatively because of the liability of foreignness and weak protection for investors. Consequentially, it leads to the Principal-Principal conflict between foreign and domestic shareholders in the case of IT investment growth. These claims are reflected in Latin America, where the largest foreign ownership of MILA-listed firms may exhibit similar behavior related to IT investment growth. For these reasons, and considering the comparative institutional framework of MILA and IBEX, we present the following hypothesis:

Hypothesis 2. *The effects of the largest foreign shareholder on IT investment growth are more negative among MILA-listed firms than among IBEX-listed firms.*

3.3. Largest institutional ownership and IT investments

Unlike individual shareholders, large institutional owners control, even exerting pressure on, the firm's management through its participation, which involves voting power among other legal mechanisms, and their interest on maintaining a stable share price (Ravichandran et al., 2009).

In Anglo-American common-law institutional contexts, large institutional investors have become important as, in many cases, they own more than half of the capital of listed firms (Ravichandran et al., 2009; Xue et al., 2021). Additionally, previous studies on corporate governance show a growing activism by these investors, including confrontations with poorly managed firms, and showing significant effects on firm's business strategy, international diversification, and R&D investment. Effects that are comparable to investment

in IT owing to its long-term orientation (Aghion et al., 2013; Choi et al., 2012; Douma et al., 2006).

Additionally, stock market analysts understand IT as a strategic resource that firms must invest in. Under this premise, firms that do not demonstrate adequate IT investment commitment can be questioned or penalized by large institutional shareholders (Choi et al., 2012).

The largest non-financial and financial institutional investors, such as banks in emerging economies, tend to play a central role, for example, in the appointment of top management, the design of strategic directions, and the allocation of organizational resources, which would influence the IT investment process significantly (Chang et al., 2006; Choi et al., 2012).

Likewise, studies suggest two opposing views on the role of large institutional ownership (Ravichandran et al., 2009). First, some researchers indicate that institutional shareholders have fiduciary obligations to maximize long-term value, ensuring that firms generate stable returns and make long-term investments to ensure future returns, consequently mitigating short-term management behavior, and underinvestment in R&D (Aghion et al., 2013; Bushee, 1998; Douma et al., 2006). This behavior can be related to IT decentralization, which reduces information asymmetry, limit the interference of senior managers with detailed IT operations, and causes information processing to be less subject to manipulation when moving up the hierarchy, thus ensuring that it is further shared with external institutional shareholders (Xue et al., 2021). Consequently, previous studies showed positive effects of institutional ownership on IT investments in developed (US) and developing (Korea) countries, before and after the global crisis, respectively (Choi et al., 2012;

Ravichandran et al., 2009). Therefore, we assume that the largest institutional ownership of IBEX-listed firms may have similar behavior in relation to IT investment growth.

Second, other researchers indicate that large institutional shareholders have a more short-term behavior focused on immediate returns than individual shareholders, leading the firm to a short-term decision-making approach, including investments (David et al., 2001; Ravichandran et al., 2009). This behavior leads to an IT centralized power that allows top managers to control information and hide more firm-specific information (Xue et al., 2021). This information asymmetry could undermine the monitoring effectiveness of external institutional investors and make the manipulation of IT investments less detectable. Moreover, we must consider the defense against weak shareholder protection rights and judicial systems, and the behavior of certain local owners in emerging economies who become foreign owners (e.g., offshore holdings) to return later as the largest institutional owner (Huang & Shiu, 2009). Therefore, we assume that the largest institutional ownership of MILA-listed firms may have similar behavior in relation to IT investment growth. For these reasons, and considering the comparative institutional framework between MILA and IBEX, we present the following hypothesis:

Hypothesis 3. *The effects of the largest institutional shareholder on IT investment growth are more negative among MILA-listed firms than among IBEX-listed firms.*

3.4. Common ownership and IT investments

The role of institutional investors as a new ownership structure in corporate governance has changed, showing their heterogeneity (Hoskisson et al., 2002). After the different crises that occurred in the last decades (dot.com, financial, and possibly Covid-19), a small group of large institutional investors, characterized by passive stocks under management with a high

level of shareholder activism (Goranova & Ryan, 2014), and represented by BlackRock, Vanguard, Fidelity, State Street, created and expanded a significant and novel form of ownership with intra-industry diversification (Chiao et al., 2020) throughout the world's stock markets. This overlapping institutional ownership in similar industries is referred to as common ownership (Azar et al., 2018; Azar & Vives, 2021; Connelly et al., 2019; Schmalz, 2021). These big four together reported nearly $ 15.5 trillion in 2017 (Wang & Barrese, 2019). Indeed, the proportion of American listed firms with common institutional ownership, as co-owners of at least 5% of the capital stock of other firms in the same industry, grew from less than 10% in 1980 to approximately 60% in 2014 (He & Huang, 2017), and these four common forms of ownership types are found in approximately 90% of 500 Standard & Poor's (S&P) firms (Azar & Vives, 2021). MILA and IBEX are not strangers to this landscape. Common ownerships hold almost 3.5% of participations in MILA-listed firms and approximately 6.5% in IBEX-listed firms in 2020 and are growing quickly.

On the one hand, these common forms of ownership aim to maximize the value of their portfolios rather than their individual firms (Wang & Barrese, 2019). First, firms in their portfolios assume the externalities of these common forms of ownership, such as R&D patents (Chiao et al., 2020) or public announcements of technological implementation related to large IT budgets and future returns on investment, owing to digitization. Geng et al. (2016) found that competing common properties within similar industries can mitigate opportunistic behavior concerning patents and incentivize the growth of investment in R&D related to technological progress. Likewise, common property is correlated with a lower probability of being controlled externally (e.g., patent litigation). Therefore, common property is negatively associated with the time it takes to resolve this patent process (Chiao et al., 2020) or solving problems regarding the strength or weakness of the judicial system

and the protection of shareholders under the institutional context of civil law, whether this is a developed or developing market.

On the other hand, Azar et al. (2018) categorized corporate governance mechanisms that can enhance anticompetitive incentives using common ownership: doing nothing, using votes, using voice, and compensation. The evidence from these schemes has helped prevent future oligopolistic concentrations of these common forms of ownership (Azar & Vives, 2021) in developed common law institutional settings. It also becomes relevant to ascertain the effects of this common ownership on the IT investments of listed firms in contexts such as Ibero-America. Furthermore, evaluating firms with traditional ownership structures suggests that this new ownership structure would not have concentration levels, as it is still growing in the MILA and IBEX markets. However, they have an impact as they exist widely in listed firms around the world. Therefore, its influence could be comparatively more decisive in developing economies that require an external reference that encourages the firms to invest more in technology (e.g., MILA) than in developed economies where the focus could be more oriented towards innovation and development (e.g., IBEX). Taking into account all these factors and considering an institutional comparative framework, we present the following hypothesis.

Hypothesis 4. *New institutional investors with common ownership on IT investment growth are more positive among MILA-listed firms than among IBEX-listed firms.*

4. Method

4.1. Design, data source and sample

This study develops a hypothetical-deductive model through a non-experimental longitudinal causal design based on balanced panel data with Ibero-American-listed firms from 2009 to 2015 (Figure 3.1). That is, we cover the period since the end of the global financial crisis and the Pacific Alliance creation (with the publication of action plans on corporate governance to face the region's global financial crisis) till 2015 when Spain began reforms due to its new code of good governance for listed firms.

Figure 4.1. Model

Institutional Context: MILA vs IBEX
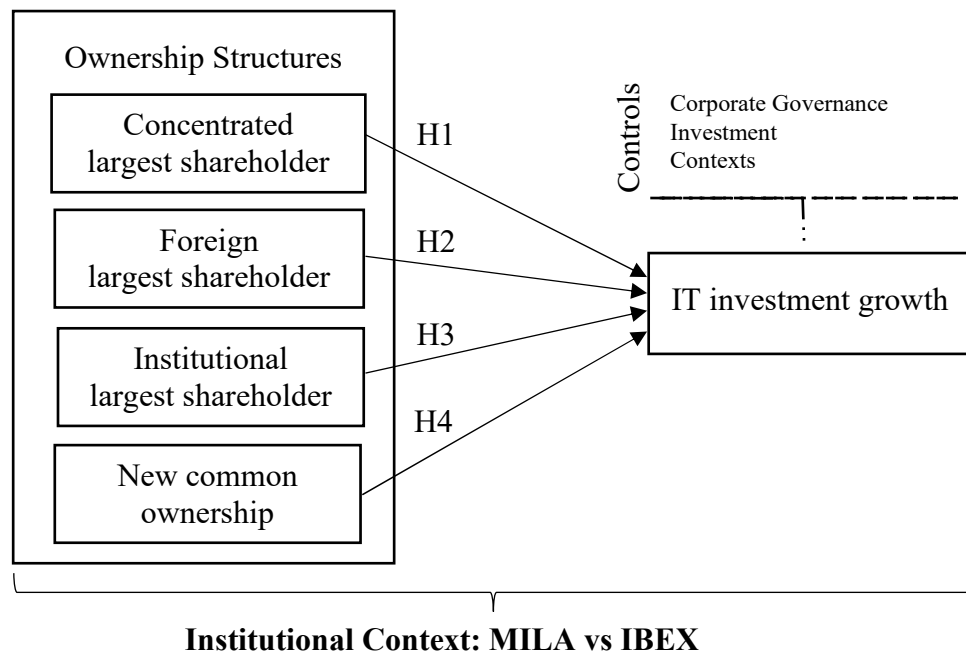
The study uses the MILA (Chile, Colombia, Mexico, and Peru) and IBEX (Spain) stock exchange markets. The regression panel considered the previous studies in pooled OLS and fixed effects (Ho et al., 2011; Ravichandran et al., 2009), which we evaluated subsequently using Breusch and Pagan multiplier and the Hausman tests, confirming the use of fixed-effect models.

The data sources come from two aspects: accounting/financial and corporate governance variables (**¡Error! No se encuentra el origen de la referencia.**). First, accounting/financial data concerning MILA-listed firms came from the Bloomberg Terminal[1] (https://bba.bloomberg.net), while the data concerning IBEX-listed firms came from Refinitiv Eikon[2] (https://eikon.thomsonreuters.com). Second, the corporate governance data came from the firms' audited annual reports from the issuers' repositories of each country's Stock Exchange. Moreover, the study used the data source from Worldwide Governance Index (https://info.worldbank.org/governance/wgi) to know the institutional governance measurements of each country in the study period for robustness checks.

Table 4.1. Variables definition

Variable	Definition
Dependent Variables	
IT investment growth	(IT investment$_{t+1}$ - IT investment$_t$)/ IT investment$_t$
Independent Variables	
Largest **concentrated** shareholder	Dummy that captures the percentage of common stock outstanding held by the largest owner with more than 50% of firm participation.
Largest **foreign** shareholder	Dummy that captures the percentage of common stock outstanding held by the largest owner with foreign participation.
Largest **institutional** shareholder	Dummy that captures the percentage of common stock outstanding held by the largest owner with institutional participation.
Common ownership	Percentage of outstanding common stock held by institutional investor with common ownership members (Fidelity Investments, The Vanguard Group, State Street, BlackRock) contrast with the overlap ratio: $\left.\sum_k^{C_{ij}} COH_k \middle/ \left(\sum_k^{C_{ij}} COH_k + \sum_l^{D_{ij}} DOH_l\right)\right.$
Control Variables	
IT investment	IT spending / Total assets
Largest shareholder	Percentage of outstanding common stock held by the largest owner.
Board size	Natural logarithm of total board members by firm.
Board independence	Proportion measured as the number of independent directors serving on the board divided by the board size.

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[1] Bloomberg Terminal (n.d.). [MILA annual financial statement analysis, 2009-2015, in USD] https://bba.bloomberg.net/

[2] Refinitiv Eikon (n.d.). [Spanish firms annual income statements 2009-2015 in US dollars] https://eikon.thomsonreuters.com/index.html

CEO duality	Likelihood to have a CEO Duality = 1, otherwise = 0
R&D growth	Annual R&D spending growth rate based on percentage change of annual R&D spending amount by firm.
Net sales growth	Annual growth rate of net sales
ROA	Return of Assets (Net Income / Total Assets)
EPS	Natural logarithm of earning per share
Leverage	Financial leverage, measured as long-term debt divided by total assets
Firm size	Natural logarithm of total assets
Firm age	Natural logarithm of firm age
Industry	Industries according to Standard Industrial Classification (SIC) code. 1=Agriculture, Forestry and Fishing (0100-0999); 2=Mining (1000-1499); 3=Construction (1500-1799); 4=Manufacturing (2000-3999); 5=Transportation, Communications, Electric, Gas and Sanitary service (4000-4999); 6=Retail Trade (5200-5999); 7=Finance, Insurance and Real Estate (6000-6799)
Country	MILA: Peru=1, Chile=2, Mexico=3, Colombia=4 IBEX: Spain=5

Source: Own elaboration

The sample considered complete variables information, obtaining a sample of 308 firms giving a total of 2,156 firm-year observations (Table 4.2).

Table 4.2. Firm by year

	MILA				MILA	IBEX	MILA + IBEX
	Chile	Colombia	Mexico	Peru	Total	Spain	Total
Year	N	N	N	N	N	N	N
2009	78	21	62	99	260	48	308
2010	78	21	62	99	260	48	308
2011	78	21	62	99	260	48	308
2012	78	21	62	99	260	48	308
2013	78	21	62	99	260	48	308
2014	78	21	62	99	260	48	308
2015	78	21	62	99	260	48	308
2009-2015	546	147	434	693	1820	336	2,156

Source: Own elaboration

The selection criteria included firms founded in their own country where they started their initial public offering, with complete information, since the global financial crisis and

common industries in the five countries (Table 4.3). Specifically, these observations included seven common industries in the studied countries: Agriculture, Forestry, and Fishing (SIC 0100-0999); Mining (SIC 1000-1499); Construction (SIC 1500-1799); Manufacturing (SIC 2000-3999); Transportation, Communications, Electric, Gas, and Sanitary service (SIC 4000-4999); Retail Trade (SIC 5200-5999); and Finance, Insurance, and Real Estate (SIC 6000-6799).

Table 4.3. Firms by industry

| | MILA | | | | | | | | | | MILA | | IBEX | | MILA+IBEX | |
| | Chile | | Colombia | | Mexico | | Peru | | Total | | Spain | | Total | | | |
Industry	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Agriculture, Forestry and Fishing (SIC 0100-0999)	49	0.09	0	0.00	28	0.06	35	0.05	112	0.06	7	0.02	**119**	0.06
Mining (SIC 1000-1499)	28	0.05	7	0.05	14	0.03	112	0.16	161	0.09	14	0.04	**175**	0.08
Construction (SIC 1500-1799)	56	0.10	28	0.19	21	0.05	56	0.08	161	0.09	56	0.17	**217**	0.10
Manufacturing (SIC 2000-3999)	126	0.23	7	0.05	126	0.29	168	0.24	427	0.23	56	0.17	**483**	0.22
Transportation, Communications, Electric, Gas and Sanitary service (SIC 4000-4999)	126	0.23	49	0.33	28	0.06	77	0.11	280	0.15	119	0.35	**399**	0.19
Retail Trade (SIC 5200-5999)	98	0.18	7	0.05	91	0.21	35	0.05	231	0.13	21	0.06	**252**	0.12
Finance, Insurance and Real Estate (SIC 6000-6799)	63	0.12	49	0.33	126	0.29	210	0.30	448	0.25	63	0.19	**511**	0.24
Total	546	1.00	147	1.00	434	1.00	693	1.00	1820	1.00	336	1.00	**2,156**	1.00

Source: Own elaboration

4.2. Variables

4.2.1. *Dependent variable*

IT investment growth. The measurements were related to the growth ratio (Xue et al., 2021). Considering the seminal empirical paper of corporate governance on IT investment (Loh & Venkatraman, 1993), this study considers IT expenditures in hardware, software, personnel, projects, consulting, and service contracts.

Initially, IT Investment has been described as the ratio between the budget for IT spending and the firm's income, a definition which was directly adopted in the first studies (Loh & Venkatraman, 1993). Subsequently, IT investment was also described as IT capital, considering the firm IT spending on total assets (Chwelos et al., 2010; Dong et al., 2021; Ho et al., 2011, 2017), or as IT intensity, considering the IT spending on sales (Ravichandran et al., 2009). Recent studies have considered the need to estimate growth ratios, to reduce endogeneity problems at the time of estimating the models and reinforce causal effects (Xue et al., 2021). Indeed, in many cases, reconstructions have been made based on references from previous or proxy values of firms' financial statements. Therefore, a couple of years before the global financial crisis, a group of academics in information systems with institutional support at the international level began to compile and report average indexes of IT expenditures at the regional, country, and industry levels, as well as to break down the types of IT expenditures by budget sub-level, including hardware, software, personnel, consultancies, and projects (Kappelman et al., 2020).

For our study, we use these reports (i.e., Kappelman et al., 2020) considering the variations by region (Latin America and Europe) and by industry (using SIC). This information is then contrasted with the national indices reported by each country regarding national ICT expenditures, differentiating private from the state (Hofman et al., 2016). These ratios are

then aligned to the firm's financial statements by industry, and the IT spending per firm is calculated based on the firm's income (Loh & Venkatraman, 1993). Based on this result, the next step is the calculation of the IT investment per firm as IT capital (Chwelos et al., 2010; Dong et al., 2021; Ho et al., 2011, 2017), that is, IT spending on total assets per firm. Finally, the IT investment growth ratio is calculated by applying the basic growth rate formula: (IT investment $_{t+1}$ - IT investment $_t$)/ IT investment $_t$

4.2.2. Independent variables

Largest concentrated shareholder. This variable is widely discussed in various empirical studies, where its orientation tends to be related to principal-agent or principal-principal problems, such as IT investment (Ho et al., 2017; Loh & Venkatraman, 1993). Previous studies show that high levels of concentration are related to more than 50% of the company's shares during the analysis period (Céspedes et al., 2010; Choi et al., 2012; Martins et al., 2017). Operationalization is conducted through a dummy variable related to holding the largest shareholder to represent the identity of this ownership (Martins et al., 2017).

Largest foreign shareholder. The study considers the largest foreign shareholder as a measurement of the percentage of the common shares of the largest shareholder identified outside the country in which the firm is established within our study period. The direct effects reported in previous studies are mainly attributed to the global measurement of foreign ownership of IT, reporting divergent results in emerging contexts (Choi et al., 2012; Ho et al., 2011). The direct relationship between IT returns is negative (Ho et al., 2011). Simultaneously, IT innovation performance is positive (Choi et al., 2012). The latter is related to R&D outcomes more significantly and, therefore, this result can be considered contrary to a direct effect on IT expenditures as inputs to future value creation. Therefore,

we reinforce the position that the effects on developing markets, even with the largest foreign shareholder, could potentially be negative. Thus, we consider, in addition, a dummy variable related to holding the largest shareholder to represent its identity.

Largest institutional shareholder. Previous studies on the institutional shareholder variable consider its measurement as the percentage of common shares held by institutional investors. There are two relevant published studies on the institutional ownership of IT investments (Ravichandran et al., 2009; Xue et al., 2021). One of them reports a positive relationship between IT intensity and innovation performance before (Ravichandran et al., 2009) and after (Choi et al., 2012) the global financial crisis, respectively. The most recent study reports a non-significant negative effect on the growth ratio of IT investment commitment (Xue et al., 2021). Both studies were for the case of developed markets. The last result is closely consistent with our objectives. Therefore, targeting only the largest shareholder in the developing and concentrated markets would help provide new findings. Therefore, operationalization is based on a dummy variable as its identity.

Common ownership. Considering previous studies that have defined this new institutional investor variable as common ownership (Azar et al., 2018; Connelly et al., 2019; He & Huang, 2017), we use the least complex representation to contrast the data collection. One study helps to consider the overlap in the percentage of institutional ownership (Connelly et al., 2019). A structuring of potential contrast is developed on the direct data collection of the most relevant institutional investors of common property identified by Refinitiv Eikon and Bloomberg Terminal (Fidelity Investments, Vanguard Group, BlackRock, and State Street).

4.2.3. Control variables

Following the previous literature on these models (Ho et al., 2011; Xue et al., 2021), we consider IT capital a control variable related to capturing the IT needs meant to be covered by firms in the study periods that would potentially determine the growth of their investment.

The first variable corresponds to the corporate governance variables represented by the largest shareholder, board independence, and CEO duality. A relevant study related to Latin America defines the origin of the largest shareholder, where its evolution and typology undergoes concentration, foreign and institutional participation (Kabbach de Castro et al., 2012). For these reasons, and considering the recent motivations for identifying shareholder democratization in Ibero-American context, including comparisons with the US and OECD countries, we consider its use as relevant (Aguilera et al., 2019). Likewise, previous studies on IT investment and ownership structures use board independence in their tests (Ho et al., 2011; Xue et al., 2021) This variable has mixed results, being primarily insignificant but developing significant negative levels in more specific control tests associated with the reduction of IT centralization (Xue et al., 2021), moreover, we included the board size. Additionally, CEO duality (Krause et al., 2014) is attributed to potential problems related to conflicts of leadership structures in determining investment decisions.

The second type corresponds to the variables related to the investments represented by research and development growth, net sales growth, return on assets (ROA), earnings per share (EPS), leverage, firm size, and firm age. Previous studies that have addressed the relationship between ownership structures and IT investments have always considered these variables, to control potential relevant relationships by which IT investments can be conditioned (Ho et al., 2011; Ning et al., 2019; Ravichandran et al., 2009; Xue et al., 2021).

Finally, the third type corresponds to the variables related to the context represented by the industry, country, and year. As sustained in this study, the seven years after the global financial crisis were considered. We consider the year 2015 as a cutoff, when Spain updated its parameters for corporate governance and the IBEX stock market. Regarding Latin America, we cover the countries that make up the Pacific Alliance and represent the first integrated stock market. The industries used are the most relevant sectors for comparison in which firms participate for the five countries and the MILA and IBEX markets. These variables were used within the model to determine the control and fixed effects.

4.3. Regression model

As a procedure, we began the search for previous empirical models of corporate governance on IT investments (Ho et al., 2011; Ravichandran et al., 2009; Xue et al., 2021), identifying mixed models due to the field's novelty. Initially, we elaborate on the econometric model building.

$$IT\ investment\ growth_{it}$$

$$= \alpha_{it} + \sum_{j=1}^{12} \beta_j Controls_{it} + \beta_{13} OwnershipStructure_{it} + u_{it}$$

Initially, the general model is developed as a pooled OLS, diagnosing multicollinearity through each variable's variance inflation factor (VIF). The general model has a mean VIF = 2.37 (acceptable range between 1 to 3). Then, the autocorrelation is diagnosed through a Wooldridge test for serial correlation in panel-data models, obtaining a Prob>F = 0.1776, not rejecting the H0: no first-order autocorrelation. Then, we use the Breusch and Pagan Lagrangian multiplier test (Prob>chibar2 = 1.00), confirming that a random-effects model is better than an OLS. Subsequently, we show a Hausman specification test (Prob>chi2 = 0.000), confirming that a fixed-effects model is better than a random-effects. Therefore, the

study uses fixed-effects estimators with the robust option related to standard errors adjusted for clusters. Since the model does not include a lagged explanatory variable as independent variable and the variables of the general model in prior tests demonstrate exogeneity, we omit the use of dynamic models.

4.4. Summary statistics and preliminary analyses

Table 4.4 shows the average values and standard deviations of IT investment growth in the study countries. Likewise, we made the grouping according to the stock markets they represent (MILA and IBEX). According to the data, although all the countries exhibited positive growth rates after the financial crisis, in 2015, a process of contraction began.

Table 4.4. IT investment growth by years

| | MILA | | | | | | | | MILA | | IBEX | | MILA+IBEX | |
| | Chile | | Colombia | | Mexico | | Peru | | Total | | Spain | | Total | |
Year	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
2009-2010	0.384	1.20	0.365	0.61	0.231	0.23	0.289	0.29	0.310	0.72	0.010	0.16	0.266	0.67
2010-2011	0.126	0.30	0.279	0.80	0.101	0.20	0.121	0.22	0.131	0.32	0.083	0.30	0.124	0.32
2011-2012	0.550	0.47	0.533	0.43	0.467	0.31	0.674	1.02	0.576	0.71	0.357	0.22	0.542	0.66
2012-2013	0.447	2.57	0.166	0.58	0.083	0.14	0.039	0.21	0.181	1.42	0.000	0.13	0.153	1.31
2013-2014	0.015	0.29	0.111	0.16	0.073	0.13	0.082	0.33	0.062	0.27	0.141	0.52	0.074	0.32
2014-2015	-0.095	0.17	0.008	0.53	-0.059	0.12	-0.044	0.22	-0.059	0.23	0.004	0.43	-0.049	0.27
2009-2015	0.238	1.20	0.242	0.57	0.149	0.26	0.193	0.53	0.200	0.76	0.101	0.35	0.185	0.72

Source: Own elaboration

Concerning the heterogeneity of ownership structures (Table 4.5), we separate the evolution of the four types of ownership, including the evolution of the largest shareholder that integrates the identity of the largest concentrated shareholder, the largest foreign shareholder, and the largest institutional shareholder. Expectedly, the largest concentrated shareholding increases in MILA, and decreases in IBEX. In contrast, the largest foreign shareholding and the largest institutional shareholding have been decreasing in both stock markets, with the contractions in IBEX being more pronounced. In conclusion, as a trending issue explained in the institutional framework and the literature review, common ownership has grown steadily in both stock markets with very pronounced growth.

Table 4.5. Ownership structure heterogeneity

year	Largest Shareholder		Largest Concentrated Shareholder		Largest Foreign Shareholder		Largest Institutional Shareholder		Common Ownership	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
MILA										
2009	0.556	0.27	0.734	0.18	0.656	0.27	0.667	0.30	0.016	0.03
2010	0.552	0.27	0.731	0.18	0.644	0.27	0.669	0.29	0.028	0.05
2011	0.552	0.27	0.739	0.18	0.649	0.28	0.664	0.30	0.035	0.06
2012	0.557	0.27	0.739	0.18	0.633	0.28	0.632	0.30	0.031	0.05
2013	0.552	0.27	0.740	0.18	0.637	0.28	0.607	0.30	0.039	0.08
2014	0.559	0.27	0.750	0.18	0.619	0.29	0.620	0.30	0.038	0.06
2015	0.561	0.27	0.752	0.18	0.644	0.28	0.620	0.29	0.034	0.05
2009-2015	0.556	0.27	0.741	0.18	0.640	0.28	0.639	0.30	0.032	0.06
IBEX										
2009	0.544	0.28	0.805	0.16	0.602	0.31	0.523	0.27	0.030	0.04
2010	0.505	0.27	0.769	0.16	0.558	0.33	0.485	0.27	0.034	0.04
2011	0.488	0.26	0.774	0.15	0.517	0.29	0.456	0.26	0.038	0.04
2012	0.486	0.26	0.775	0.13	0.449	0.30	0.427	0.24	0.044	0.05
2013	0.457	0.26	0.752	0.15	0.410	0.31	0.401	0.26	0.051	0.05
2014	0.469	0.25	0.738	0.13	0.486	0.29	0.390	0.24	0.054	0.05
2015	0.433	0.26	0.774	0.12	0.420	0.30	0.369	0.27	0.067	0.06
2009-2015	0.482	0.26	0.770	0.14	0.486	0.30	0.434	0.26	0.046	0.05

Source: Own elaboration

Table 4.6. Differences in means

	MILA (N=1820)		IBEX (N=336)		t-test (N=2156)	
	mean	se	mean	se	mean	se
1. IT investment growth	0.200	[0.02]	0.100	[0.02]	**-0.099****	[0.047]
2. IT investment	0.030	[0.00]	0.020	[0.00]	**-0.004*****	[0.001]
3. Largest shareholder	0.560	[0.01]	0.480	[0.01]	**-0.074*****	[0.016]
4. Largest concentrated shareholder	0.580	[0.01]	0.390	[0.03]	**-0.182*****	[0.030]
5. Largest foreign shareholder	0.230	[0.01]	0.320	[0.03]	**0.087*****	[0.026]
6. Largest institutional shareholder	0.210	[0.01]	0.460	[0.03]	**0.246*****	[0.025]
7. Common Ownership	0.010	[0.00]	0.040	[0.00]	**0.027*****	[0.003]
8. Board size	2.070	[0.01]	2.570	[0.02]	**0.501*****	[0.021]
9. Board independence	0.300	[0.01]	0.420	[0.01]	**0.116*****	[0.013]
10. CEO duality	0.120	[0.01]	0.480	[0.03]	**0.351*****	[0.022]
11. R&D growth	0.007	[0.01]	0.010	[0.00]	**0.005*****	[0.000]
12. Net sales growth	0.680	[0.49]	0.020	[0.02]	-0.660	[1.162]
13. ROA	0.050	[0.00]	0.030	[0.00]	**-0.023*****	[0.005]
14. EPS	-2.110	[0.05]	-0.320	[0.07]	**1.794*****	[0.113]
15. Leverage	0.910	[0.04]	1.520	[0.19]	**0.614*****	[0.121]
16. Firm size	7.190	[0.04]	9.480	[0.12]	**2.287*****	[0.107]
17. Firm age	3.450	[0.02]	3.330	[0.06]	**-0.122****	[0.053]

Source: Own elaboration

Concerning the difference in the means between the MILA and IBEX markets (

Table 4.6), practically all the model variables show significant differences, except for the growth of R&D and the growth of net sales. The significant differences with higher values toward the MILA are the IT investment growth, IT investment, the largest shareholder, and its concentrated identity. Likewise, the ROA and the age of the firms show differences with higher mean values in the MILA-listed firms. The variables with significant differences in IBEX are the identities of the largest foreign shareholder, the largest institutional shareholder, and common ownership. Additionally, other relevant values that differ significantly in favor of IBEX are Board independence, CEO duality, EPS, leverage, and firm size.

Table 4.7 shows the correlation matrix, where the growth of IT investment has a significant relationship with the growth of R&D, EPS, and firm age. Further, IT investment, as capital, shows a significant relationship with almost all the variables, being the inverse or negative relationships with the largest institutional shareholder, the board's independence, the growth of R&D, leverage, and firm size.

Table 4.7. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. IT investment growth	1.00																
2. IT investment	-0.04	1.00															
3. Largest shareholder	0.00	0.09***	1.00														
4. Largest concentrated shareholder	0.01	0.09***	0.81***	1.00													
5. Largest foreign shareholder	-0.02	0.13***	0.14***	0.10***	1.00												
6. Largest institutional shareholder	-0.01	-0.21***	0.07**	0.01	0.14***	1.00											
7. Common Ownership	-0.03	0.04	-0.22***	-0.19***	-0.03	0.05*	1.00										
8. Board size	-0.04	-0.07**	-0.30***	-0.25***	-0.16***	0.14***	0.39***	1.00									
9. Board independence	-0.01	-0.10***	-0.12***	-0.09***	0.07**	0.18***	0.21***	0.32***	1.00								
10. CEO duality	-0.04	0.00	-0.07**	-0.08**	0.07**	0.08**	0.10***	0.23***	0.13***	1.00							
11. R&D growth	-0.06*	0.58***	-0.07**	-0.05	0.01	-0.04	0.22***	0.31***	0.11***	0.18***	1.00						
12. Net sales growth	-0.01	-0.02	0.04	0.03	-0.01	0.00	-0.01	-0.02	0.01	-0.02	-0.02	1.00					
13. ROA	0.03	0.24***	0.16***	0.12***	0.04	-0.07**	0.00	-0.17***	-0.21***	-0.03	0.08**	-0.06*	1.00				
14. EPS	-0.06*	-0.04	0.01	-0.01	0.08**	0.24***	0.11***	0.14***	0.00	0.13***	0.12***	-0.09***	0.29***	1.00			
15. Leverage	0.04	-0.22***	-0.16***	-0.12***	-0.04	0.07**	0.02	0.19***	0.09***	0.08**	0.00	0.02	-0.23***	0.02	1.00		
16. Firm size	-0.04	-0.31***	-0.17***	-0.13***	-0.09***	0.25***	0.25***	0.53***	0.26***	0.12***	0.11***	0.00	-0.29***	0.23***	0.32***	1.00	
17. Firm age	-0.05*	0.12***	-0.15***	-0.08***	-0.10***	0.01	0.01	0.08***	-0.03	-0.04	0.06*	-0.01	-0.03	0.03	-0.03	0.14***	1.00
mean	0.18	0.03	0.54	0.55	0.25	0.25	0.02	2.14	0.32	0.18	0.00	0.16	0.05	-1.85	1.00	7.54	3.43
sd	0.72	0.02	0.27	0.50	0.43	0.43	0.04	0.40	0.23	0.38	0.00	2.22	0.08	1.85	2.03	1.96	0.88
median0	0.08	0.02	0.52	1.00	0.00	0.00	0.00	2.20	0.29	0.00	0.00	0.07	0.04	-1.91	0.57	7.41	3.47
min	-1.00	0.00	0.02	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	-61.34	-0.68	-11.51	-25.45	-0.92	0.00
max	21.16	0.17	1.00	1.00	1.00	1.00	0.59	3.18	1.00	1.00	0.04	68.71	0.91	5.50	27.98	14.33	5.17

Source: Own elaboration

5. Empirical results

5.1. Ownership structures heterogeneity on IT investment growth

After the correlation analysis, the panel data estimations by fixed-effects regression yield the results that help open the discussion on the research. First, Table 5.1 shows the estimations considering the MILA and IBEX markets separately. Therefore, Model 1 contains the general variables used for IT investment growth. Models 2, 3, 4, and 5 refers to hypotheses 1, 2, 3, and 4. Moreover, Model 1 shows significant differences in the effects of some predictor variables. For MILA, IT investment and R&D growth affects IT investment growth positively. The largest shareholder, net sales growth, and firm size affect IT investment growth. For IBEX, R&D growth and ROA affect IT investment growth negatively. In contrast, net sales growth affects IT investment growth positively. One of the important control aspects to be highlighted is that for MILA-listed firms, predictive control with a high coefficient that positively influences IT investment growth is IT investment as capital. In the case of IBEX-listed firms, the control variable that influences IT investment growth significantly and positively, is net sales growth. Model 2 retains the same control variables with significant levels of IT investment growth. The largest concentrated shareholder shows a significant negative effect on IT investment growth in MILA-listed firms compared with IBEX-listed firms. This result confirms the institutional context of concentrated ownership structures (Céspedes et al., 2010; Jara et al., 2019; Saona & San Martín, 2018), in which, the principals can demonstrate their pressure as risk aversion under their traditional conservativeness and power, by conditioning the agent's decision to reduce IT investment (Loh & Venkatraman, 1993; Ning et al., 2019). Specifically, the costs of Principal-Principal conflict are greater that their benefits in institutional contexts with weak markets (i.e., MILA countries), whereas in the institutional contexts with strong markets (i.e., IBEX) this balance is reversed. Thus, *H1 is supported*.

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Table 5.1. Ownership heterogeneity on IT investment growth (MILA vs. IBEX)

	Dependent variable: IT investment growth									
	MILA					*IBEX*				
	model 1	model 2	model 3	model 4	model 5	model 1	model 2	model 3	model 4	model 5
IT investment	**5.484***	**5.474***	**5.509***	**5.529***	**5.526***	0.372	0.396	0.277	0.391	0.405
	(3.14)	**(3.14)**	**(3.14)**	**(3.17)**	**(3.17)**	(0.62)	(0.66)	(0.43)	(0.63)	(0.70)
Largest shareholder	**-0.239***	**-0.276***	**-0.265***	**-0.193***	**-0.216***	0.026	0.041	-0.022	0.009	0.029
	(-2.75)	**(-1.86)**	**(-2.76)**	**(-2.36)**	**(-2.47)**	(1.00)	(0.89)	(-0.72)	(0.46)	(1.09)
Board size	0.062	0.062	0.064	0.067	0.067	-0.002	-0.003	0.004	-0.008	0.000
	(0.92)	(0.90)	(0.96)	(0.98)	(1.03)	(-0.09)	(-0.10)	(0.13)	(-0.29)	(0.01)
Board independence	-0.079	-0.078	-0.086	-0.077	-0.079	-0.032	-0.033	-0.026	-0.029	-0.028
	(-0.93)	(-0.90)	(-1.03)	(-0.90)	(-0.94)	(-1.30)	(-1.33)	(-1.04)	(-1.11)	(-1.14)
CEO duality (d)	-0.005	-0.005	-0.004	-0.006	-0.010	-0.001	-0.001	-0.001	-0.001	0.002
	(-0.16)	(-0.16)	(-0.15)	(-0.21)	(-0.34)	(-0.15)	(-0.27)	(-0.14)	(-0.12)	(0.33)
R&D growth	**0.911***	**0.911***	**0.911***	**0.912***	**0.912***	**-9.406***	**-9.449***	**-9.172***	**-9.191***	**-9.653***
	(27.21)	**(27.19)**	**(27.19)**	**(27.25)**	**(27.33)**	**(-2.71)**	**(-2.72)**	**(-2.91)**	**(-2.74)**	**(-2.73)**
Net sales growth	-0.009	-0.008	-0.008	-0.009	-0.009	**10.262***	**10.304***	**10.033***	**10.049***	**10.501***
	(-1.54)	(-1.54)	(-1.53)	(-1.55)	(-1.55)	**(3.00)**	**(3.00)**	**(3.23)**	**(3.03)**	**(3.01)**
ROA	0.702	0.705	0.705	0.709	0.694	0.107	0.109	0.109	0.114	0.093
	(1.39)	(1.39)	(1.39)	(1.40)	(1.37)	(0.93)	(0.95)	(0.90)	(0.96)	(0.80)
EPS	-0.020	-0.020	-0.020	-0.020	-0.021	-0.000	0.000	0.002	-0.000	-0.002
	(-1.17)	(-1.17)	(-1.17)	(-1.18)	(-1.22)	(-0.00)	(0.01)	(0.46)	(-0.05)	(-0.41)
Leverage	0.005	0.005	0.005	0.005	0.005	-0.000	0.000	-0.000	0.000	0.001
	(0.58)	(0.58)	(0.58)	(0.55)	(0.57)	(-0.03)	(0.01)	(-0.20)	(0.06)	(0.25)
Firm size	-0.055	-0.055	-0.055	-0.053	-0.055	**0.022***	**0.022***	**0.022***	**0.023***	0.019
	(-1.21)	(-1.20)	(-1.21)	(-1.18)	(-1.22)	**(1.73)**	**(1.76)**	**(1.83)**	**(1.78)**	(1.49)
Firm age	-0.114	-0.116	-0.118	-0.111	-0.115	0.016	0.016	0.018	0.017	0.009
	(-1.24)	(-1.28)	(-1.31)	(-1.23)	(-1.30)	(0.88)	(0.91)	(0.96)	(0.84)	(0.48)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
H1: Largest Concentrated Shareholder (d)		-0.250** (-2.56)					0.029 (1.02)			
H2: Largest Foreign Shareholder (d)			-0.198* (-1.86)					0.039 (1.31)		
H3: Largest Institutional Shareholder (d)				-0.316*** (-2.89)					0.041 (1.13)	
H4: Common Ownership					0.804*** (2.87)					0.145* (2.01)
Fixed Effects										
Industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1382	1382	1382	1382	1382	237	237	237	237	237
Number of firms	260	260	260	260	260	46	46	46	46	46
Model df	16	17	17	17	17	16	17	17	17	17
Error df	259	259	259	259	259	45	45	45	45	45
F-test	140.28***	132.78***	134.53***	132.21***	132.45***	1907.14***	1805.72***	2522.60***	2016.50***	2318.20***
R^2	0.894	0.894	0.894	0.894	0.894	0.991	0.991	0.992	0.991	0.992
Adjusted R^2	0.892	0.892	0.892	0.892	0.893	0.991	0.991	0.991	0.991	0.991

All panel-data estimations are generated by Fixed-effects (within) regression. N are listed firms from 2009 to 2015.

Panel-data estimations from MILA include Chile, Colombia, Mexico and Peru, while from IBEX include Spain.

Heteroscedastic robust standard errors are used to calculate t-statistics in parentheses and adjusted for clustering on firm.

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. (d) for discrete change of dummy variable from 0 to 1.

Similarly, Model 3 shows that the control variables of the first and second models have significant effects on IT investment growth. Likewise, the largest foreign shareholder has a significant negative effect on IT investment growth in MILA-listed firms compared to IBEX-listed firms. This result demonstrates that the largest foreign shareholder does not necessarily affect investments positively. It is possible that these foreign owners, being the largest, could choose the institutional logic described previously (Huang & Shiu, 2009) as a defense behavior against the weak shareholder protection and judicial systems.

We could also anticipate these results with the descriptive summaries, where the tendency to reduce participation of this type of shareholder is becoming more progressive in both stock markets, and more pronounced in IBEX, implying a non-significant relationship. Therefore, its effect on IT investment growth is negative. Specifically, the greater are the risks, the less motivated would foreign owners to invest in IT, which returns would be only visible in long-term. Thus, the transaction costs increase and, particularly, monitoring is more costly in contexts with weak institutions, thus foreign owners will be more short-term oriented and less likely to increase their investments in IT in MILA in comparison to the decisions in IBEX. Therefore, *H2 is supported*.

Similarly, for Model 4, the estimation control variables show the same effects as in the previous models. Additionally, the largest institutional shareholder has a significant negative effect on IT investment growth in MILA-listed firms compared with IBEX-listed firms. This result suggests the centralizing behavior of IT in developing markets, such as MILA-listed firms. Furthermore, these results can be reinforced, owing to the weakness of shareholder protection and the judicial system, where the largest foreign shareholder is more conservative in institutional contexts with more turbulence, or volatility in the MILA context, discouraging the agent's decisions in IT investments. The contraction of the largest

institutional shareholder also reinforces part of these results after the financial crisis, which has potentially been reflected in the result as insignificant as it is more pronounced in IBEX and its progressive improvement in its protection of shareholders and the judicial system. Therefore, its effect is negatively significant on IT investment growth. Thus, *H3 is supported*.

In conclusion, Model 5 does not show any variations in the control variables that support it. However, common ownership shows significant positive effects on IT investment growth in MILA- and IBEX-listed firms. Unlike the previous largest shareholders (foreign and institutional), institutional investors with common ownership continue to grow in Ibero-American countries, assuming the institutional challenge of better integrating the information, information asymmetry reduction, and showing more activism (Goranova & Ryan, 2014). Certainly, these institutional investors (Fidelity Investments, Vanguard Group, BlackRock, and State Street) are already part of, practically, all IBEX-listed firms and a significant part of MILA-listed firms. One of the controversial aspects of this common ownership is that it has achieved higher concentration in the face of developed markets (Azar et al., 2018; Connelly et al., 2019). However, in the civil law and Latin American markets, it continues to grow, taking advantage of the opportunities made available by developed countries such as Spain, being a relevant channel to derive to countries such as those of the Pacific Alliance, and taking advantage of its positioning with agencies in countries such as Mexico, Colombia, and Chile. Hence, *H4 is supported*.

5.2. Robustness checks

The robustness of two comparative institutional analyses is carried out the first analysis (Table 5.2) is like the original model but does not consider the financial and insurance industry owing to its many regulations and structural behavior. The results are encouraging

after this change. The effects on the MILA and IBEX markets were confirmed. Additionally, the board's independence is active for firms in the MILA market, with negative effects on IT investment. This validates the trend seen with recent results regarding IT investment commitments (Xue et al., 2021).

The second robustness check (Table 5.3) probes the worldwide governance indicators (Kaufmann et al., 2011), where countries with results lower than zero indicate that the institutional context related to governance is weak. Countries with results greater than zero indicate that the institutional context related to governance is robust. Previous studies have begun to relate countries of the Ibero-American region, to further characterize them through these indices (Martins et al., 2017). In fact, complementarities are typical of countries that share similar and comparable institutional conditions (Saona et al., 2020).

According to the results obtained, the hypotheses are supported by both robustness checks. There are variations in the predictive variables of IT investment growth, owing to the re-clustering of countries.

Table 5.2. Ownership heterogeneity on IT investment growth (without SIC 6000-6799)

	Dependent variable: IT investment growth									
	MILA					*IBEX*				
	model 1	model 2	model 3	model 4	model 5	model 1	model 2	model 3	model 4	model 5
IT investment	**4.122****	**4.144****	**4.138****	**4.259****	**4.130****	0.670	0.680	0.621	0.674	0.680
	(2.45)	**(2.46)**	**(2.45)**	**(2.52)**	**(2.46)**	(1.03)	(1.04)	(0.88)	(1.05)	(1.07)
Largest shareholder	**-0.276*****	**-0.190**	**-0.294****	**-0.221****	**-0.256*****	0.017	-0.006	-0.026	0.019	0.018
	(-2.93)	**(-1.15)**	**(-2.51)**	**(-2.38)**	**(-2.69)**	(0.55)	(-0.12)	(-0.77)	(0.93)	(0.59)
Board size	0.071	0.072	0.074	0.080	0.075	-0.032	-0.033	-0.015	-0.032	-0.032
	(0.81)	(0.83)	(0.85)	(0.91)	(0.90)	(-1.04)	(-1.05)	(-0.42)	(-0.97)	(-1.02)
Board independence	**-0.174***	**-0.176***	**-0.180***	**-0.178***	**-0.174***	-0.035	-0.035	-0.031	-0.036	-0.032
	(-1.70)	**(-1.72)**	**(-1.80)**	**(-1.74)**	**(-1.70)**	(-1.24)	(-1.24)	(-1.07)	(-1.19)	(-1.17)
CEO duality (d)	-0.021	-0.021	-0.020	-0.021	-0.023	0.002	0.003	0.002	0.002	0.006
	(-0.57)	(-0.59)	(-0.56)	(-0.57)	(-0.66)	(0.56)	(0.81)	(0.32)	(0.54)	(1.23)
R&D growth	**0.930*****	**0.930*****	**0.930*****	**0.930*****	**0.930*****	**-7.969*****	**-7.867*****	**-7.808*****	**-7.997*****	**-8.414*****
	(32.92)	**(32.92)**	**(32.90)**	**(32.94)**	**(32.97)**	**(-2.83)**	**(-2.92)**	**(-3.02)**	**(-2.75)**	**(-2.81)**
Net sales growth	-0.007	-0.007	-0.007	-0.007	-0.007	**8.852*****	**8.751*****	**8.694*****	**8.878*****	**9.285*****
	(-1.52)	(-1.56)	(-1.52)	(-1.53)	(-1.53)	**(3.20)**	**(3.30)**	**(3.42)**	**(3.10)**	**(3.15)**
ROA	0.972	0.964	0.971	0.969	0.969	0.024	0.022	0.039	0.022	0.006
	(1.61)	(1.59)	(1.61)	(1.60)	(1.60)	(0.22)	(0.20)	(0.32)	(0.20)	(0.05)
EPS	-0.028	-0.028	-0.028	-0.028	-0.029	0.003	0.003	0.004	0.003	0.002
	(-1.34)	(-1.32)	(-1.33)	(-1.35)	(-1.37)	(0.99)	(0.94)	(1.14)	(0.94)	(0.59)
Leverage	0.029	0.029	0.028	0.024	0.029	0.000	0.000	0.000	0.000	0.001
	(1.03)	(1.04)	(1.01)	(0.92)	(1.04)	(0.10)	(0.08)	(0.11)	(0.08)	(0.29)
Firm size	**-0.159*****	**-0.160*****	**-0.159*****	**-0.156*****	**-0.158*****	0.015	0.015	0.016	0.015	0.012
	(-3.15)	**(-3.15)**	**(-3.15)**	**(-3.07)**	**(-3.11)**	(1.33)	(1.28)	(1.44)	(1.32)	(1.11)
Firm age	-0.050	-0.044	-0.051	-0.054	-0.055	0.018	0.018	0.023	0.017	0.012
	(-0.44)	(-0.38)	(-0.45)	(-0.48)	(-0.49)	(1.14)	(1.13)	(1.25)	(1.07)	(0.75)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
H1: Largest Concentrated Shareholder (d)	**-0.250**** (**-2.34**)					0.012 (0.38)				
H2: Largest Foreign Shareholder (d)		**-0.254**** (**-2.36**)					0.034 (0.95)			
H3: Largest Institutional Shareholder (d)			**-0.456***** (**-4.40**)					0.015 (0.33)		
H4: Common Ownership				**0.558**** (**2.22**)					0.115 (1.61)	
Fixed Effects										
Industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1023	1023	1023	1023	1023	188	188	188	188	188
Number of firms	196	196	196	196	196	37	37	37	37	37
Model df	16	17	17	17	17	16	17	17	17	17
Error df	195	195	195	195	195	36	36	36	36	36
F-test	192.36***	181.35***	181.86***	184.16***	184.26***	1451.76***	1418.04***	1555.73***	2198.77***	1814.86***
R^2	0.910	0.910	0.910	0.910	0.910	0.992	0.992	0.993	0.992	0.993
Adjusted R^2	0.908	0.908	0.908	0.908	0.908	0.992	0.992	0.992	0.992	0.992

All panel-data estimations are generated by Fixed-effects (within) regression. N are listed firms from 2009 to 2015.

Panel-data estimations from MILA include Chile, Colombia, Mexico and Peru, while from IBEX include Spain. Models not include SIC 6000-6799.

Heteroscedastic robust standard errors are used to calculate t-statistics in parentheses and adjusted for clustering on firm.

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. (d) for discrete change of dummy variable from 0 to 1.

Table 5.3. Ownership heterogeneity on IT investment growth (WGI < 0 vs. WGI > 0)

	Dependent variable: IT investment growth									
	WGI < 0					*WGI > 0*				
	model 1	model 2	model 3	model 4	model 5	model 1	model 2	model 3	model 4	model 5
IT investment	**7.309***	**7.284***	**7.335***	**7.349***	**7.363***	**1.209***	**1.222***	**1.208***	**1.210***	**1.218***
	(3.85)	**(3.84)**	**(3.86)**	**(3.87)**	**(3.89)**	**(1.76)**	**(1.78)**	**(1.75)**	**(1.76)**	**(1.77)**
Largest shareholder	**-0.243***	**-0.331***	**-0.272***	**-0.205***	**-0.215***	-0.028	-0.002	-0.036	-0.021	-0.010
	(-2.31)	**(-2.24)**	**(-2.29)**	**(-2.36)**	**(-2.09)**	(-0.74)	(-0.04)	(-0.94)	(-0.59)	(-0.28)
Board size	0.023	0.022	0.026	0.026	0.030	-0.041	-0.040	-0.040	-0.039	-0.037
	(0.35)	(0.32)	(0.40)	(0.39)	(0.50)	(-1.40)	(-1.38)	(-1.38)	(-1.30)	(-1.27)
Board independence	0.017	0.021	0.010	0.020	0.017	**-0.072***	**-0.073***	**-0.071***	**-0.073***	**-0.071***
	(0.22)	(0.27)	(0.12)	(0.25)	(0.22)	**(-1.83)**	**(-1.84)**	**(-1.82)**	**(-1.84)**	**(-1.82)**
CEO duality (d)	0.000	0.000	0.000	-0.001	-0.006	0.006	0.005	0.007	0.006	0.018
	(0.00)	(0.01)	(0.02)	(-0.04)	(-0.19)	(0.54)	(0.45)	(0.59)	(0.54)	(1.29)
R&D growth	**0.674***	**0.674***	**0.674***	**0.675***	**0.678***	**0.959***	**0.959***	**0.959***	**0.959***	**0.958***
	(4.38)	**(4.37)**	**(4.38)**	**(4.38)**	**(4.41)**	**(47.30)**	**(47.25)**	**(47.25)**	**(47.25)**	**(47.73)**
Net sales growth	**-0.217***	**-0.217***	**-0.217***	**-0.216***	**-0.217***	-0.001	-0.001	-0.001	-0.001	-0.001
	(-5.97)	**(-5.98)**	**(-5.97)**	**(-5.97)**	**(-6.07)**	(-1.28)	(-1.33)	(-1.26)	(-1.28)	(-1.52)
ROA	**1.199***	**1.204***	**1.200***	**1.205***	**1.173***	**0.362***	**0.361***	**0.364***	**0.361***	**0.367***
	(1.96)	**(1.96)**	**(1.96)**	**(1.96)**	**(1.94)**	**(1.89)**	**(1.89)**	**(1.89)**	**(1.87)**	**(1.90)**
EPS	-0.015	-0.015	-0.015	-0.015	-0.015	**-0.012***	**-0.012***	**-0.012***	**-0.012***	**-0.014***
	(-0.56)	(-0.55)	(-0.56)	(-0.57)	(-0.58)	**(-2.21)**	**(-2.20)**	**(-2.21)**	**(-2.18)**	**(-2.53)**
Leverage	-0.002	-0.002	-0.002	-0.002	-0.002	0.004	0.004	0.004	0.004	0.006
	(-0.17)	(-0.17)	(-0.18)	(-0.22)	(-0.19)	(0.69)	(0.71)	(0.66)	(0.68)	(1.09)
Firm size	**0.108***	**0.108***	**0.108***	**0.110***	**0.107***	0.035	0.035	0.035	0.035	0.028
	(2.52)	**(2.53)**	**(2.52)**	**(2.61)**	**(2.51)**	(1.45)	(1.45)	(1.44)	(1.41)	(1.19)
Firm age	-0.160	-0.168	-0.166	-0.155	-0.164	0.005	0.006	0.007	0.005	-0.012
	(-1.41)	(-1.48)	(-1.48)	(-1.37)	(-1.51)	(0.15)	(0.17)	(0.18)	(0.14)	(-0.33)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
H1: Largest Concentrated Shareholder (d)	**-0.269**** (-2.50)					-0.021 (-0.55)				
H2: Largest Foreign Shareholder (d)		**-0.206**** (-2.01)					-0.020 (-0.39)			
H3: Largest Institutional Shareholder (d)			**-0.305**** (-2.11)					-0.035 (-0.66)		
H4: Common Ownership				**0.915***** (2.71)					**0.447***** (2.85)	
Fixed Effects										
Industries	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	967	967	967	967	967	652	652	652	652	652
Number of firms	182	182	182	182	182	124	124	124	124	124
Model df	16	17	17	17	17	16	17	17	17	17
Error df	181	181	181	181	181	123	123	123	123	123
F-test	51.98***	50.73***	49.22***	50.08***	51.58***	631.51***	613.15***	625.24***	600.61***	626.27***
R^2	0.667	0.667	0.667	0.667	0.669	0.995	0.995	0.995	0.995	0.995
Adjusted R^2	0.661	0.661	0.661	0.661	0.663	0.995	0.995	0.995	0.995	0.995

All panel-data estimations are generated by Fixed-effects (within) regression. N are listed firms from 2009 to 2015.

Panel-data estimations with WGI<0 include Colombia, Peru and Mexico, while WGI > 0 include Chile and Spain.

Heteroscedastic robust standard errors are used to calculate t-statistics in parentheses and adjusted for clustering on firm.

* $p<0.1$, ** $p<0.05$, *** $p<0.01$. (d) for discrete change of dummy variable from 0 to 1.

6. Discussion

The contribution of this study is to widen the research of corporate governance and information technology in institutional contexts using Ibero-America as the main comparative institutional analysis (Aguilera & Jackson, 2010). Likewise, it takes ownership structures as institutions capable of affecting investments over which it has participation and power from an institutional perspective. Furthermore, and under this perspective, this internal corporate governance mechanism shows its importance when making decisions regarding IT investment. The study findings have important implications in theory and practice.

6.1. Theoretical implications

This study contributes to knowledge at a theoretical level by expanding the studies that relate corporate governance to IT investments (Choi et al., 2012; Ho et al., 2011, 2017; Loh & Venkatraman, 1993; Ning et al., 2019; Ravichandran et al., 2009; Xue et al., 2021). Effectively, this study focuses on the institutional perspective, to consider ownership structures institutions and compare them within Ibero-American stock markets for different industrial markets, and Ibero-American countries after the global financial crisis. This aspect denotes control over time, countries, industries, and even the firm size under study. Scholars could enhance multilevel studies on how institutional constraints play an essential role in defining agents' decisions related to IT investment. Another critical point is considering the full participation of foreign ownership or family participation as an institutional presence (Ning et al., 2019). Even a recent study addresses the initiative to see the impact of the concentrated ownership structure with family participation on IT overinvestment or underinvestment (Ho et al., 2017). Future studies could consider other ownership structures,

including common ownership and see if they condition IT overinvestment or underinvestment. Although the study focuses on the causality of corporate governance in information technology, also we must mention that there is little research on the inverse causality of how information technology could affect corporate governance (J. Y. Bakos & Brynjolfsson, 1993; J. Y. Bakos & Nault, 1997; Y. Bakos & Katsamakas, 2008; Schmitz, 2017). However, these studies have specialized mainly in the implications of technologies in competitive and cooperative negotiations that owners assume through incomplete contracts to reconfigure their shared ownerships in partnership, basing their theoretical support on contract theory and game theory (Y. Bakos & Katsamakas, 2008; Schmitz, 2017). Future studies could focus on this inverse causality to compare different institutional contexts as Ibero-America. Likewise, a limitation was that this study did not confront the dichotomy of IT investment versus technological innovation, the latter being a fruitful field in the literature related to corporate governance (Kurzhals et al., 2020). New research could address this dichotomy by comparing institutional contexts of developed and developing economies.

6.2. Practitioner implications

At the practitioner level, the study provides a critical look at the reality of corporate governance on IT investments in Ibero-America and with different institutional contexts. Discussions in other contexts are clear. Navigating the weak institutional context of civil law markets in Ibero-America, such as MILA and IBEX, requires managers to be proactive in aligning strategies with major shareholders, balancing short-term demands, accessing capital and technology, managing risks, engaging with stakeholders, fostering innovation, and leveraging external collaborations. These actions can help mitigate the challenges associated with weak institutional contexts and facilitate the growth of IT investments in listed firms.

Indeed, in weak institutional contexts, where legal protections and regulations may be less robust, firms may become more reliant on their largest, international, or institutional shareholders. Managers need to be aware of the influence these shareholders hold over IT investment decisions and align their strategies with their expectations. This dependence can limit managerial autonomy, requiring careful navigation of the shareholders' interests to secure support for IT investments. Moreover, in weak institutional contexts, stock markets may have a higher proportion of short-term investors seeking quick returns. These investors may prioritize immediate profitability over long-term IT investments. Managers may face pressure to allocate resources towards short-term profit generation, potentially impacting the allocation of funds for IT infrastructure development or innovation. Balancing short-term demands while advocating for the long-term benefits of IT investments becomes crucial. In addition, managers may encounter challenges in securing necessary funding for large IT projects and accessing cutting-edge technologies. It becomes important to actively seek partnerships, collaborations, or alliances with international or institutional shareholders who can provide the required resources and expertise. Therefore, managers need to implement robust risk management practices to mitigate potential adverse effects on IT investments. Strengthening internal controls, ensuring transparency, and complying with regulations become even more critical to protect the company's IT assets and enhance investor confidence. Managers should encourage and incentivize employees to contribute ideas and drive technological advancements. Nurturing an environment that embraces creativity, risk-taking, and learning from failures can help companies overcome institutional limitations and exploit opportunities for IT investments. Finally, managers should consider collaborating with external stakeholders such as industry associations, research institutions, and government agencies to navigate the weak institutional context. These partnerships can help overcome regulatory barriers, access funding or grants, and leverage expertise for IT

investments. Engaging with relevant stakeholders can contribute to creating an enabling environment for IT growth despite institutional constraints.

7.   Conclusions

The study has hypothesized and compared, under an institutional perspective, how the ownership structure heterogeneity due to the largest concentrated shareholder (H1), largest foreign shareholder (H2), largest institutional shareholder (H3), or common ownership (H4) affect IT investment growth in firms listed in relevant Ibero-American stock markets. Through difference in means, the study demonstrates that IT investment, seen as expenditures and growing, can be significantly different depending on the stock market (MILA or IBEX) that we have studied. Likewise, in the regression of the data panel with robustness and different models for each ownership structure, we have shown significant effects of these internal corporate governance mechanisms on IT investment growth.

Concerning the largest concentrated shareholder, the result is negatively significant on IT investment growth. This result confirms that in Ibero-America, the theory related to ownership and control is also fulfilled.

The study shows a significant negative effect on IT investment growth in the largest foreign shareholder and the largest institutional shareholder. Although prior studies regarding total foreign ownership consider positive effects on investments, we find that, in the case of the largest foreign shareholder, the effect is like the largest concentrated shareholder, suggesting the strong implications of the institutional context as a complementary framework that affects the behavior of these structures in developing markets such as MILA.

Finally, about the common ownership, the results significantly (and positively) affect IT investment. This result is relevant to reaffirm that these institutional investors gain

relevance on IT investment. Several recent studies highlight the importance of monitoring the behavior of these institutional investors, as they could trigger profound changes in ownership structures and, consequently, on the agent decisions in the firms.

Chapter 4. Family ownership and the returns on IT investment deviations in Spanish unlisted firms: An institutional legitimacy challenge

1.   Introduction

In corporate governance, the study of ownership structures has always enjoyed a pivotal role in understanding the determinants of firm outcomes, counting on studies where these ownership influences have been heterogeneous in the firms due to their different structures (Aguilera & Crespi-Cladera, 2016; Berle & Means, 1932; Daily, Dalton, & Rajagopalan, 2003; Jensen & Meckling, 1976; La Porta et al., 1999). Even more, under current contexts of a new economy (also called "digital economy") or after global crises, recent studies have shown the relevance of the ownership structures on the strategic decisions related to IT investment on firm outcomes (Ho et al., 2011, 2017; Ning et al., 2020; Xue et al., 2021). Regarding the above, prior studies mainly recognize ownership heterogeneity through family ownership (Ho et al., 2017; Ning et al., 2020), foreign ownership, or institutional investors (Ho et al., 2011; Xue et al., 2021). These empirical findings and their discussions have gone through theoretical perspectives such as agency theory or resource dependency theory (Choi et al., 2012; Ho et al., 2011; Loh & Venkatraman, 1993; Zhang & Huang, 2012) and the institutional theory (Ho et al., 2017; Ning et al., 2020; Ravichandran et al., 2009). Indeed, this last perspective has been closer to studying the corporate governance environment and heterogeneity in investment, encouraging comparative institutional analyses (Aguilera & Jackson, 2010).

Regarding this new economy's and post-crises contexts, information system scholars have been driving IT investment studies on firm outcomes, focusing on the types of IT investments and the returns on IT investment (Brynjolfsson & Hitt, 1996; Dehning & Richardson, 2002; Gurbaxani & Whang, 1991; Lim et al., 2011; Porter & Millar, 1985), recognizing its strategic importance as a critical transactional and agency cost-reducer (Gurbaxani & Whang, 1991),

and a significant predictor variable on firm performance (Lim et al., 2011). In addition, recent efforts have focused on IT investment deviations (i.e., the presence of over or under investments) from their industries' averages (Dong et al., 2021; Ho et al., 2017; Mithas et al., 2013).

However, empirical studies based on the impact of ownership structure heterogeneity on technologies are scarce (Choi et al., 2012), and even more for returns on IT investment deviations, where the analysis is limited, traditionally, to listed firms (Dong et al., 2021; Ho et al., 2017). Thus, the comparative analysis of ownership heterogeneity in unlisted contexts is increasingly relevant. Therefore, through an institutional approach, the solid Spanish family firm context becomes a relevant example to understand the implications of the presence of family ownership heterogeneity on the returns on the IT investment deviations for unlisted firms. In the Spanish context, we find previous studies of the effects of ownership structures on investment (Crespí-Cladera & García-Cestona, 2002; Merino, 2013; Pindado & de la Torre, 2006, 2009; Tribo et al., 2007), up to studies regarding the new economy and IT investment growth (Bacchini et al., 2018; Daveri, 2002; Gómez-Plana & Latorre, 2019; Martínez et al., 2008). Therefore, the challenge of conducting empirical research related to both fields remains.

Consequently, this study examines *how family ownership structures affect unlisted firms' returns on IT investment deviations*. We also compare these results with the previous evidence found on listed firms and develop some recommendations.

To achieve this, we have developed the following: First, the study develops a literature review on ownership structure heterogeneity and the returns on IT investment deviations. In addition, it establishes a theoretical framework that supports the comparative institutional analysis, allowing the argumentation of the study hypotheses.

Second, the study develops a longitudinal dynamic design using panel data with observations from 2008 to 2018 of Spanish unlisted family firms. The data collection comes from SABI (Iberian Balance Sheet Analysis System).

Third, regarding the theoretical implications, this study widens the evidence left by empirical studies on independent that separately considered ownership structures and returns on IT investments (Dong et al., 2021; Ho et al., 2011, 2017) under unlisted family firms context. Our results show that the larger the family ownership, the higher the returns on IT overinvestment deviation. Regarding the practical implications, this study hopes to contribute to IT and management professionals in unlisted family firms, recognizing potential IT over- or under-investment decisions that could have repercussions at the higher decision levels of the firms.

2.   Ownership structure and returns on IT investments

Since IT investment assumed a strategic role related to firm performance, its relationship with the internal mechanisms of corporate governance and, mainly, with ownership structure has been an increasing concern for scholars. Indeed, a theoretical approximation of these economic fields is justified from the theory of the firm through agency and transaction costs (Gurbaxani & Whang, 1991; Jensen & Meckling, 1976), with the returns on IT investment being a decision outcome of the high levels of governance structures to reduce the agency problems.

Initially, the relationship between ownership structures and information technology investments was tested through structural equation models based on agency theory with listed American firms (Loh & Venkatraman, 1993). Ownership structure was the concentration level of the large and executive shareholders, while the IT investment was the IT budget, and the IT value, based on the installed IT market value normalized by the firm's revenue. Evidence showed that internal ownership concentration significantly influenced IT investments, as

conservative behavior reduces their value. Subsequently, a longitudinal study showed how adopting two types of ownership structures as corporate governance mechanisms (external through a joint venture and internal through the creation of multi-divisions) influenced investment in the technological innovation of American firms in the IT sector (Venkatraman et al., 1994). Under the resource-based theory and a linear regression model, this study showed that external ownership structures had a significant relationship with investment in internal (i.e., from the firm) technological innovation. In contrast, internal ownership structures had a significant relationship with investment in external (i.e., from the market) technological innovation. The discussion encouraged future studies using institutional theory to have additional information on corporate governance mechanisms, especially ownership structures.

A decade and a half later, a longitudinal study with American firms showed the relationship between three levels of institutional pressures on IT investment intensity under institutional theory. This IT investment intensity was a ratio of IT investments to firms' sales (Ravichandran et al., 2009). Through multiple regression models, the authors showed that institutional pressures from industry, partner firms (i.e., suppliers and customers), and institutional ownership would affect IT investment. Regarding the ownership structure, the study showed a significant positive relationship between institutional ownership in IT, conditioned to the institutional pressure from the industry and partner firms as customers. Likewise, the period analyses confirmed that the relationship between this institutional ownership and IT investment had a significant positive impact after the internet creation in the market as a new economic context. For these reasons, a research implication suggested evaluating whether ownership structures could influence an IT overinvestment due to IT adoption rather than value creation.

Then more longitudinal studies based on agency and resource dependency theories with listed firms in emerging country markets followed (Choi et al., 2012; Ho et al., 2011; Zhang & Huang, 2012). One of the longitudinal studies with firms in the Taiwanese electronics sector

showed that the greater the foreign ownership in small firms, the more positive the return on IT investment (Ho et al., 2011). Another longitudinal study with Korean firms analyzed how the heterogeneity of ownership structures influenced the return on investment in technological innovation (Choi et al., 2012). This study showed no significant effect of ownership concentration on the return on investment in technological innovation. However, foreign ownership and institutional investor showed positive effects. Additionally, another longitudinal study in American firms showed that unconcentrated ownership structures, with adequate corporate governance (e.g., delay to hostile bidders, voting rights, protection of directors and executives, as well as adequate defense against hostile acquisition and adoption of local laws), had a positive effect by large IT-specific investment (Zhang & Huang, 2012). Subsequently, a literature review focused on IT and business strategy from agency theory and transaction costs proposed how the corporate governance field and its theories would help deepen research on IT investment, through the different corporate governance mechanisms such as ownership structure, boards of directors, or leadership structure (Drnevich & Croson, 2013).

Under the previous arguments, a more precise approximation to our study related to a Spanish context (Gargallo Castel & Galve Górriz, 2017) shows that the owners of manufacturing family firms positively moderate the effects of IT investments (measured as an accumulated investment in computer equipment and data processing information adjusted for the depreciation rate, and divided by the number of workers) on firm performance (defined as value added per worker). The study also confirmed significant differences between family and non-family firms on the returns on IT investment, evidencing that the returns are higher in family firms.

More recently, longitudinal studies under institutional theory have focused on corporate governance mechanisms on the return on IT investment deviations (Dong et al., 2021; Ho et al., 2017). Closer to our concerns, Ho et al. (2017) introduced a new approach to relate the

ownership structure to the return on IT investments, considering the presence of overinvestment and underinvestment deviations (Mithas et al., 2013), as shown in the following definition:

Deviation

$$= \begin{cases} \textit{overinvestment } (\equiv \textit{ IT investment } - \textit{ industry average}), \\ \qquad \textit{if IT } > \textit{ industry average}; \\ \textit{underinvestment } (\equiv \textit{ industry average } - \textit{ IT investment}), \\ \qquad \textit{if IT investment } \leq \textit{ industry average}. \end{cases}$$

Source: (Ho et al., 2017; Mithas et al., 2013)

Concerning that, family ownership concentration positively moderates the influence of IT underinvestment on the firm's performance.

One of the frameworks expressed in this study to approach this evidence was the "legitimacy challenge." Legitimacy has been widely discussed in organizational studies, from institutional theory (Powell & DiMaggio, 1991) to later establishing itself as an independent perspective. Indeed, it is claimed that organizational "legitimacy" is synonymous with "institutionalization" (Suchman, 1995). This perspective mentions that there can be three types of legitimacy depending on the degree of maturity of the firms and their markets: accepted or cognitive legitimacy, appropriate or pragmatic legitimacy, and debatable or moral legitimacy (i.e., legitimacy challenge) (Greenwood et al., 2017; Suchman, 1995). According to our study, this legitimacy challenge would be understood as unlisted firms with family ownership structures that require the recognition of their stakeholders to continue growing should have actions on their investments that must lead them to efficient outcomes to legitimate them with their markets (Berrone et al., 2022). From this perspective, the returns on IT investment deviations would show extreme situations that would affect firm outcomes, which should be mitigated with the intervention of the family presence. Indeed, evidence from listed American firms showed significant results regarding positive returns on IT underinvestment and IT overinvestment, and the family presence as a reducer of these effects (Ho et al., 2017).

However, due to the large capital of the listed firms and their legitimacy in the market, the study had to test the deviations as quadratic, so the first investment deviations show positive effects towards market returns, and only in their extreme deviation reflect its negative effects. Therefore, the discussion of analyzing investment deviations in other contexts, such as in unlisted firms with more family heterogeneity, should not necessarily be seen as quadratic models. This is explained because unlisted firms do not have as much capital as listed ones, and the overinvestment and underinvestment deviations could negatively affect financial performance (Dong et al., 2021).

For all these reasons, we will first argue in the context of unlisted firms about the differences between family and non-family firms and their implications for IT investments. Then, we will argue about the effects of family presence on the returns of IT investment deviations.

2.1. Family vs. non-family ownership structures and IT investment

Family businesses are the most popular type of ownership structure in most of the world's economies (Gomez-Mejia et al., 2011; Miller et al., 2007; Pindado & Requejo, 2015). Also in Spain, where families are one of the most represented institutions in the ownership structure of unlisted Spanish firms (Gomez-Mejia et al., 2001; Gómez-Mejía et al., 2007). Analyzing this family presence, most family business definitions include three main dimensions related to the governance structure: the family participation in the senior management, the family members or chairmanship of the board of directors, and the family shareholdings (Cortés & Botero, 2016; Villalonga & Amit, 2006).

According to the literature review, a family firm responds to several definitions according to the family ownership: the largest shareholder, multiple family members, owner or manager founder, management or board representation, among others (Pindado & Requejo, 2015). Likewise, these definitions came with different considerations regarding participation, for

instance, to be equal to or greater than 50% shareholding, focusing on concentrated ownership with a high level of control, and others. Other authors consider a family firm if it has a founding family or it is the largest shareholder, where average participation of 20% or even less is enough.

Likewise, the differences between non-family and family firms are widely discussed academically (Miller et al., 2007). Indeed, from a transaction cost perspective, the family firm as a government structure presents advantages and disadvantages in terms of internal coordination and incentives for its business performance compared to other government structures (Federo et al., 2020). For instance, there are disadvantages resulting from the concentration of family control, such as the projection of family conflicts towards the firm, the difficulties of sanctioning family members to maintain the family unit, or the difficulties of professionalization or promotion of family talent, or the lack of resources due to family isolation or inefficient allocation of resources, limiting business growth (Gargallo Castel & Galve Górriz, 2017).

In addition, the trend towards family concentration in unlisted firms is a common behavior in all countries, despite the different institutional characteristics or regulatory frameworks (Gomez-Mejia et al., 2011; La Porta et al., 1999; Pindado & Requejo, 2015).

Regarding concentration, academics argue that concentrated shareholders, such as founding families, can obtain greater benefits by pursuing objectives such as technology investment, company growth, or firm survival (Gargallo Castel & Galve Górriz, 2017). However, these family ownership structures undertake actions that maximize personal utility and family interest, instead of maximizing organizational benefit, and even increase costs when unqualified family members assume management positions, being able to alter and divert investment decisions. Furthermore, family control is not only present in small and medium-

sized firms. Thus, academic studies have expanded these contexts by considering the ventures of founders and large companies, such as listed family corporations.

Among the advantages, family ownership can influence the firm's objectives, preferences, and decisions through supervision and incentives for investments, resources, and capabilities (Pindado & Requejo, 2015). These effects are related to the desire to retain ownership and control of the firm from the founding owner through members who share family ties, with control passing even to later generations. Therefore, the interaction of the family structure impacts the resource management, affecting the returns on investments, for instance, related to innovation or technology (Duran et al., 2016). Likewise, some scholars consider that high levels of control have emotional, filial, loyalty, and shared-value reasons that denote non-monetary benefits among members, such as their influence, altruism, socio-emotional wealth, reputation, and legitimacy (Gomez-Mejia et al., 2011).

Finally, the arguments about the performance of family firms compared to non-family firms are also supported by institutional economics in agency theory, coordination costs, and corporate governance (Chrisman et al., 2004). Indeed, agency costs decrease value creation, and the more the firm wants to grow, its coordination costs will grow. However, when ownership and control are in the hands of the same members (principal and agent), agency costs due to vested interests, conflicts of interest, and information asymmetry are significantly reduced. In addition, information technology investment, which is the subject of our analysis, plays an essential role as a resource in reducing coordination costs (Gurbaxani & Whang, 1991; Ho et al., 2011). Consequently, family businesses have incentives to minimize internal coordination costs and maximize value creation from their investments (Gargallo Castel & Galve Górriz, 2017). This can make family-owned firms more willing to invest in IT, even if the immediate returns are uncertain or not immediately apparent. This can help to ensure that IT investments are aligned with the overall strategy of the firm and that the benefits of the

investment are fully realized (Ho et al., 2017). For these reasons, we propose the following hypothesis:

H1: There are significant differences between Spanish unlisted firms, family and non-family, regarding IT investment.

2.2. Family ownership, IT investment deviation, and firm performance

Currently, IT investment is a relevant topic worldwide, as well as research and development, and Spain is no exception. Some Spanish institutions track down R+D and IT expenses through reports that allow a comparative understanding of index evolution over the years and their comparisons by industry (Bacchini et al., 2018; Gómez-Plana & Latorre, 2019). Indeed, the National Institute of Statistics collects annual indexes of expenses in R+D and IT. It separates the government of firms concerning their industries. In addition, other institutions, such as the Ministry of Economic Affairs and Digital Transformation, show reports with these indexes.

In addition, when comparing Spanish firms, one of the essential characteristics is their ownership structures (Crespí-Cladera & García-Cestona, 2002). Proportionally, it is evident that the Spanish firm is constituted with family ownership (Crespí-Cladera & García-Cestona, 2002; de Miguel et al., 2004) with a proxy related to the largest shareholder or ownership concentration. Likewise, considering the term related to the working capital, the firms seek to achieve efficient firm performance through cash flows, leverage, or market value. In addition, aspects such as the firms' size or age could also play a role. Even context conditions like years and industries could influence.

Taking up the IT investment issue, Spain has shown continuous growth in this spending at the firm level (Gargallo Castel & Galve Górriz, 2017; Gómez-Plana & Latorre, 2019). Indeed, the indicators show sustainable growth even after crises such as the financial one. However, some

discussions revolve around whether the investment that the country's firms make compared to their peers in the European Union is sufficient, showing one of the pending aspects related to the measurement of the deviations of these IT investments (Bacchini et al., 2018; Díez-Esteban et al., 2016).

Therefore, considering the recent literature in this field, Spain could be a place to study these deviations related to overinvestment or underinvestment in IT concerning the average IT investment by industry, and comparing family and non-family unlisted firms due to their differentiated size and leverage (Gargallo Castel & Galve Górriz, 2017).

This approximation is attributed to an institutional concept called "legitimacy challenges" (Ho et al., 2017). Indeed, legitimacy challenges can directly influence IT investments through partners or owners who ensure digital business continuity to improve firm performance. However, suppose owners do not want to commit across business scope because they do not understand the IT investment decision. In that case, they could perceive it as an irrational red flag, attenuating their investments and, therefore, their effects. Indeed, the issue is still controversial. Previously, a meta-analysis of the impacts of the family presence on innovation investment returns would confirm that the family, being conservative, significantly reduces internal innovations and is also prudent with the promotion of external innovations (i.e., investment through acquisition) (Duran et al., 2016), which would give strong indications regarding the returns on IT investment deviations.

H2a: Family owners positively moderate the financial returns on IT overinvestment of Spanish unlisted firms.

H2b: Family owners positively moderate the financial returns on IT underinvestment of Spanish unlisted firms.

Figure 2.1. Returns on IT investment deviations
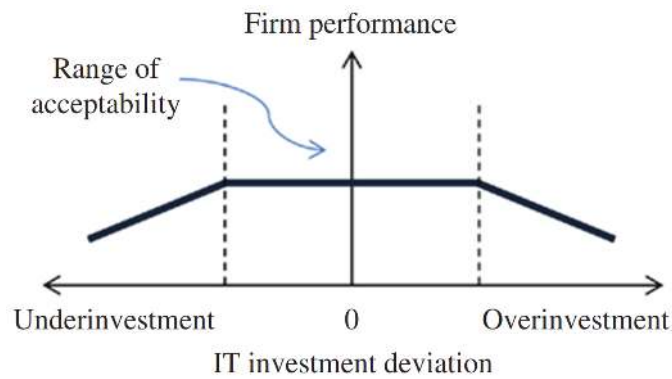
Source: (Ho et al., 2017)

3. Method

3.1. Design and sample

The design is a non-experimental longitudinal study that uses the dynamic panel data model, following the Generalized Method of Moments (GMM). We use a GMM estimator to alleviate endogeneity concerns in two adapted aspects of corporate governance research (Wintoki et al., 2012): the effect of ownership structure on firm performance and the determinants of returns on investment. The estimator incorporates the dynamic nature of internal governance choices to provide instruments that address unobserved heterogeneity and simultaneity.

The sample collects data from the Iberian Balance Analysis System (SABI), Bureau Van Dijk Electronic Publishing. This SABI platform provides information on approximately 2.5 million Spanish firms, with 1,673,741 active firms for our study. This platform has accounting and financial information from annual balance sheets, stock market, industry, and ownership structure information.

From active firms, the data collection considered the availability of the last 10 years of complete information (2008-2018). As a result, the final sample was 3,056 unlisted firms, including family firms (FF) and non-family firms (NFN), from the nine industries at the two-digit level of the US Standard Industrial Classification (SIC). Due to firm homogeneity and

industry similarity, these nine SIC two-digit level categorizations were re-categorized to six. Likewise, the study restricted the Finance, Insurance, and Real Estate industry (SIC 60-67) due to different treatment in their financial and market behavior.

3.2. Variables

3.2.1. Dependent variables.

According to the literature review on returns on IT investment, the study uses the firm's financial performance (Dehning et al., 2005; Dehning & Richardson, 2002; Ho et al., 2011, 2017; Lim et al., 2011). To be more specific in the models, we use the ROA for unlisted firms. ROA is the net income over total annual assets, widely used in corporate governance research and firm performance (Ho et al., 2011).

Figure 3.1. ROA from Family Firms (FF) and Non-Family Firms (NFN)
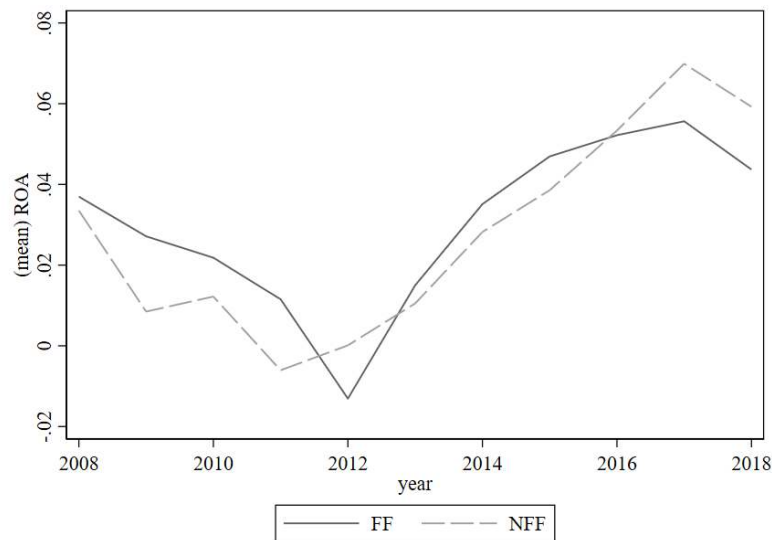
Source: Own elaboration

3.2.2. Independent variables.

IT overinvestment is the difference between firm IT capital and industry IT relative to industry peers when this IT capital is greater than the industry IT average and zero otherwise.

According to the literature review, to operationalize the IT investment deviations, one must start with the IT investment's principal independent variable *IT capital* (Ho et al., 2011, 2017;

Lim et al., 2011). This variable is estimated using the hedonic price method and considering spending on hardware, software, facilities, employees, consultants, contractors, cloud services (SaaS, PaaS, IaaS, process, +), and other IT add-ons (Kappelman et al., 2019), divided by total assets. To calculate the IT capital, we use the annual IT spending indexes by type of firms and industries published annually in "The Annual Society for Information Management IT Issues and Trends Study" from MIS Quarterly (Kappelman et al., 2019). Likewise, the study considered the Information and Communication Technologies (ICT) sector indicators reported in the National Institute of Statistics and the evolution of investment in the ICT sector from the Red.es portal of the Ministry of Economic Affairs and Digital Transformation. Based on IT capital and following the literature review, the study operationalizes the IT over- and underinvestment variables (Ho et al., 2017). The study considers IT investment at the industrial level (*industry IT*) to obtain IT over- and underinvestment values. *Industry IT* is the average IT investment of firms in the same industry based on the Standard Industrial Classification (SIC). Thus, IT investment deviation is the difference between IT capital and industry IT (Mithas et al., 2013).

Figure 3.2. IT overinvestment of firms with non-Concentrated and Concentrated Family Ownership
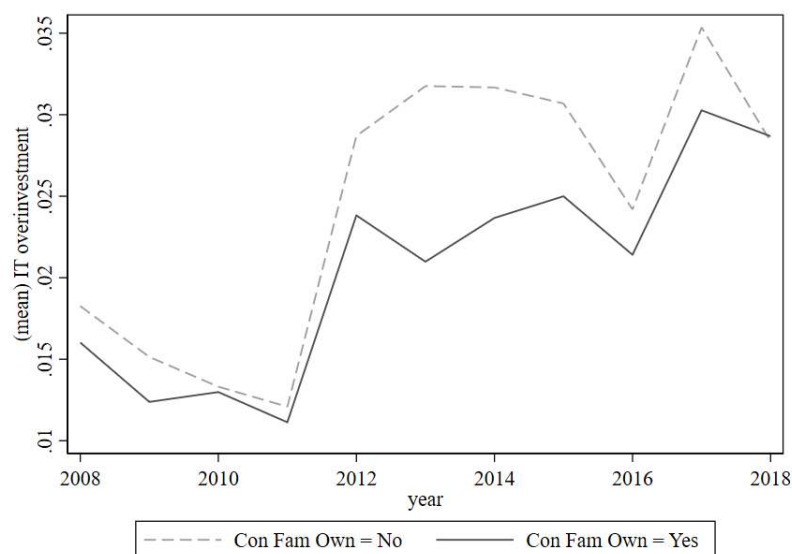
Source: Own elaboration

IT underinvestment is the difference between industry IT and IT capital relative to industry peers when firm IT capital is less than or equal to industry IT average and zero otherwise.

Family ownership is the percentage of ordinary shares held by family members to represent ownership. Often, this representation involves concentrated ownership (Ho et al., 2017). According to the literature review, we consider family participation when the family is the founding owner or part of the firm's principal shareholders. Likewise, we consider family concentration when it exceeds 50% participation (Pindado & Requejo, 2015).

Table 3.1. Definition of variables

Variable	Definition	Data Source
Dependent Variables		
ROA	Return of Assets measured as net income divided by the year-end book value of total assets.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Independent Variables		
IT over-investment	IT overinvestment relative to industry peers, measured as the difference between IT capital and industry IT if a firm's IT capital is greater than the industry average IT investment and zero; otherwise; IT capital is estimated using the hedonic-price method and taking into consideration the spending in hardware, software, facilities (including Supplies & Consumables), employees, consultancies, contractors, cloud services (SaaS, PaaS, IaaS, process, +), and others (Kapelmann et al., 2020) divided by total assets; Industry IT is measured as the average of IT capital in the firm's SIC industry.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing / IT investment index (Kapelmann et al.)
IT under-investment	IT underinvestment relative to industry peers, measured as the difference between industry IT and IT capital if a firm's IT capital is smaller than or equal to the industry average IT investment and zero otherwise.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing / IT investment index (Kapelmann et al.)
Family Ownership	Family ownership is measured as the percentage of common stock outstanding held by family members (family founders and principal shareholder). Likewise, family concentration considers equal or more than 50% of participation.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Control Variables		
R&D	Annual R&D spending growth rate based on the percentage change of the annual R&D spending amount divided.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Sales growth	The annual growth rate of a firm's sales	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
FCF	Free cash flow (FCF), measured as liquidity ratio, represents the cash available for the firm to repay	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing

	creditors or pay dividends and interest to investors as short-term obligations.	
Leverage	Financial leverage is measured as long-term debt divided by total assets.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Market Value	The market value of unlisted firms is measured as the natural logarithm of a firm's equity.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Firm size	Natural logarithm of total assets.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Firm age	Natural logarithm of firm age.	Sistema de Análisis de Balances Ibéricos (SABI) - Bureau Van Dijk Electronic Publishing
Industry	Industry according to SIC code. 1=Agriculture, Forestry, and Fishing (0100-0999); Mining and Energy (1000-1499); Construction (1500-1799); 2=Manufacturing (2000-3999); 3=Transportation, Communications, Electric, Gas, and Sanitary service (4000-4999); 4=Wholesale Trade (5000-5199); Retail Trade (5200-5999); 5=Finance, Insurance, and Real Estate (6000-6799) 6=Services (7000-8999)	Standard Industrial Classification

Source: Own elaboration

3.2.3. Control variables.

The model operationalizes family ownership, research and development spending, sales growth, free cash flow, leverage, firm market value, firm size, and firm age.

Research and development **(R+D)** spending is a measure that shows the potential long-term, intangible benefit of impacting firm performance. The operationalization is based on the evolution index of firms' R+D spending at the country and industry levels from the National Institute of Statistics and the firms' sales according to annual balances.

Sales growth is a measure of the annual growth rate of a firm's sales.

Free cash flow (FCF) measured as liquidity ratio, represents the cash available for the firm to repay creditors or pay dividends and interest to investors as short-term obligations.

Leverage is a control measure of the capital structure since debt financing can influence the firm's performance. The measurement is based on the long-term debt divided by the firm's capital. Shareholders may have incentives to expropriate bondholders' profits by investing in

high-risk, high-return projects. Bondholders can demand higher rents by increasing debt (Jensen & Meckling, 1976). Consequently, debt financing may induce managers to keep their promises to pay future cash flows. Therefore, higher leverage can reduce cash flows available to spend at managers' discretion (Jensen, 1986). Since previous research on IT investment reports a negative relationship of leverage with ROA (Brynjolfsson & Hitt, 1996; Ho et al., 2011, 2017), we expect a negative coefficient.

Firm market value for unlisted firms is a proxy calculated by the logarithm of capital.

Other used controls are *firm size* calculated as the logarithm of total assets and *firm age* calculated as the logarithm of the firm's years since its creation.

We also include industry and year as dummy variables to control these characteristics.

3.3.   Generalized Method of Moments (GMM)

The econometric analysis procedure takes the linear dynamic data panel model, following the Generalized Method of Moments (GMM) adjusted by Arellano & Bond (1991). This procedure builds an estimator that uses instrumental variables based on lags and differences of all model variables, especially proposed for data panels with many firms (i) and a few years (t).

Specifically, the model to be estimated is:

$$y_{it} = \beta_0 y_{i,t-1} + \beta_1 x_{i,t-1} + \beta_2 w_{i,t-1} + v_i + \varepsilon_{it}$$

The basic assumptions of the model are strict exogeneity ($E[\varepsilon_{it}|X_i, v_i] = 0$), homoscedasticity, and no autocorrelation ($E[\varepsilon_{it}\varepsilon_{js}|X_i, v_i] = \sigma_\varepsilon^2$ if *i=j* and *t=s* likewise =0 if $i \neq j$ or $t \neq s$, and ordinal effects, where the columns of *T x K* from the data matrix X_i are x'_{it}. No average independence is assumed. Therefore, the effects can be fixed or random, so it is allowed $E[v_i|X_i] = h(X_i)$, in addition, a fixed number of years *T* (Greene, 2020).

The lagged dependent variable in this model denotes an estimation hurdle, in addition to the composite disturbance in the model ($v_i + \varepsilon_{it}$). The correlation between $y_{i,t-1}$ and ($v_i + \varepsilon_{it}$) is nonzero because $y_{i,t-1} = \beta x'_{i,t-1} + \delta y_{i,t-2} + v_i + \varepsilon_{i,t-1}$, $Cov[y_{i,t-1}, (vi + \varepsilon_{it})] = \sigma_v^2 + \delta Cov[y_{i,t-2}, (vi + \varepsilon_{it})]$. If T is big and $0 < \delta < 1$, then this covariance will be approximately $\sigma_v^2/(1 - \delta)$. The big T assumption will not hold in most cases. But because δ will generally be positive, its covariance is expected to be at least greater than σ_v^2. The implication is that both OLS (pooled) and GLS in this model will be inconsistent. Unlike the case of the static model ($\delta = 0$), the treatment of only fixed effects does not solve the problem. Neither OLS nor GLS is useful as estimators. Therefore, instrumental variables are available within the model structure proposed by Arellano & Bond (1991). With strictly exogenous regressors, not only are all lagged values of y_{is} for s prior to t-1, but all values of x_{it} are also enabled as instruments.

Considering the previous explanation, the model is the following:

$$FirmPerformance_{it}$$
$$= \beta_0 FirmPerformance_{i,t-1}$$
$$+ \beta_1 OwnershipStructure_{i,t-1} \; x \; \beta_2 ITinvestment \; deviation^2_{i,t-1}$$
$$+ \beta_3 ControlVariables_{i,t-1} + v_i + \varepsilon_{it}$$

Likewise, concerning IT investment deviation (overinvestment and underinvestment), we consider a three-way interaction for each deviation:

$$\beta_1 OwnershipStructure_{i,t-1} \; x \; \beta_2 ITinvestment \; deviation^2_{i,t-1}$$
$$= \alpha_0 OwnershipStructure_{i,t-1} + \alpha_1 IToverinvestment_{i,t-1}$$
$$+ \alpha_2 IToverinvestment^2_{i,t-1}$$
$$+ \alpha_3 OwnershipStructure_{i,t-1} \; x \; IToverinvestment_{i,t-1}$$
$$+ \alpha_4 OwnershipStructure_{i,t-1} \; x \; IToverinvestment^2_{i,t-1}$$
$$+ \alpha_5 ITunderinvestment_{i,t-1} + \alpha_6 ITunderinvestment^2_{i,t-1}$$
$$+ \alpha_7 OwnershipStructure_{i,t-1} \; x \; ITunderinvestment_{i,t-1}$$
$$+ \alpha_8 OwnershipStructure_{i,t-1} \; x \; ITunderinvestment^2_{i,t-1}$$

Regarding the control variables, these are made up as follows:

$$\beta_3 ControlVariables_{i,t-1}$$
$$= \gamma_1 R\&D_{i,t-1} + \gamma_2 SalesGrowth_{i,t-1} + \gamma_3 FCF_{i,t-1} + \gamma_4 Leverage_{i,t-1}$$
$$+ \gamma_5 MarketValue_{i,t-1} + \gamma_6 FirmSize_{i,t-1} + \gamma_7 FirmAge_{i,t-1}$$

Finally, regarding the model disturbance, two orthogonal components are assumed as fixed effects: industry and the years of study of the firms: $\nu_i = \nu_1 Industry_i + \nu_2 Year_i$

4. Results

4.1. Differences in means and correlation analysis

The sample includes family firms (12,677) and non-family firms (11,654). A difference in means analysis shows that there are no significant differences between the two groups regarding financial performance ROA (0.001), sales growth (0.089), leverage (0.004) and FCF (0.004). However, there are significant differences regarding IT over-investment (0.002), IT under-investment (0.002), and firm age (0.009) with a higher means in non-family firms.

Likewise, there are significant differences regarding IT investment (0.002), R&D (0.179), market value (0.120), and firm size (0.033), with a higher average in family firms. Although the results do not differentiate between the groups of firms concerning financial returns, they would confirm the discussions related to family-owned firms and their IT investment orientation, but with low IT investment deviation compared to non-family firms. ***Therefore, the H1 is supported.***

Table 4.1. Difference in means concerning NFF and FF

	Non-Family Firms (N=11654)		Family Firms (N=12677)		t-test (N=24331)	
	mean	se	mean	se	b	se
ROA	0.041	(0.002)	0.040	(0.001)	0.001	(0.002)
IT investment	0.079	(0.001)	0.081	(0.001)	**-0.002***	(0.001)
IT overinvestment	0.023	(0.001)	0.020	(0.000)	**0.002****	(0.001)
IT underinvestment	0.022	(0.000)	0.020	(0.000)	**0.002****	(0.000)
Family ownership	0.000	(0.000)	0.882	(0.002)	**-0.882****	(0.002)
R&D	2.501	(0.015)	2.680	(0.011)	**-0.179****	(0.018)
Sales growth	0.185	(0.043)	0.095	(0.027)	0.089	(0.050)
Leverage	0.547	(0.002)	0.550	(0.002)	-0.004	(0.003)
FCF	0.028	(0.002)	0.024	(0.001)	0.004	(0.003)
Market value	6.310	(0.017)	6.430	(0.013)	**-0.120****	(0.022)
Firm size	2.407	(0.012)	2.440	(0.009)	**-0.033***	(0.015)
Firm age	3.146	(0.003)	3.137	(0.002)	**0.009****	(0.003)

* p<0.05, ** p<0.01, *** p<0.001

Focusing the study on unlisted family firms (12,677), an analysis of differences in means divides the sample into family firms with ownership concentration > 50% (12,023) and those without concentration (654). First, the evidence confirms that Spanish family firms have a higher proportion of concentrated ownership. The ownership concentration (>50%) indicates that a significant majority of the firm's shares are held by the family, allowing them to exert a higher level of influence over strategic decisions, management appointments, and resource allocation. This concentration of ownership facilitates effective control over the firm's direction and ensures that decision-making aligns with the family's objectives and interests. Second, according to the concentration, the mean in family concentration represents 0.919 of the ownership structure. The presence of concentrated ownership in Spanish unlisted family firms signifies a strong commitment to preserving the family's legacy and values. Family firms often prioritize long-term sustainability and continuity, driven by a desire to uphold the family's reputation and values over generations. The higher ownership concentration reflects the family's intent to maintain control over the firm, ensuring that its operations and strategic decisions align with the family's vision, traditions, and long-standing values. Third, the evidence shows no significant differences regarding IT underinvestment, sales growth, and FCF. Despite the above, the results show significant differences regarding financial performance ROA (0.015), IT overinvestment (0.004), R&D (0.945), leverage (0.020), market value (0.836), firm size (0.704) and firm age (0.071) with higher average values in non-concentrated family firms. Regarding the results, concentrated ownership in Spanish unlisted family firms could serve as a protective mechanism against external interference. This protection becomes particularly important in civil law contexts where family firms may face pressures from external stakeholders or potential acquirers. Concentrated ownership acts as a deterrent, reducing the likelihood of external factors influencing or challenging the family's control over the firm.

Table 4.2. Difference in means concerning Concentrated and Non-Concentrated FF

	ConFamOwn = No (N=654)		ConFamOwn=Yes (N=12023)		t-test (N=12677)	
	mean	se	mean	se	b	se
ROA	0.054	(0.005)	0.039	(0.001)	**0.015****	(0.005)
IT overinvestment	0.024	(0.002)	0.020	(0.000)	**0.004***	(0.002)
IT underinvestment	0.019	(0.001)	0.020	(0.000)	-0.000	(0.001)
R&D	3.576	(0.053)	2.631	(0.011)	**0.945*****	(0.050)
Family ownership	0.205	(0.006)	0.919	(0.002)	**-0.715*****	(0.007)
Sales growth	0.091	(0.027)	0.096	(0.028)	-0.004	(0.122)
Leverage	0.569	(0.009)	0.549	(0.002)	**0.020***	(0.009)
FCF	0.030	(0.007)	0.023	(0.001)	0.007	(0.005)
Market value	7.223	(0.060)	6.386	(0.013)	**0.836*****	(0.059)
Firm size	3.108	(0.059)	2.404	(0.009)	**0.704*****	(0.041)
Firm age	3.204	(0.012)	3.134	(0.002)	**0.071*****	(0.010)

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Finally, due to non-significant differences related to IT underinvestment, the sample of unlisted family firms is divided between firms with IT overinvestment and firms with IT underinvestment, concerning the average for each industry. Mainly, the evidence shows that there is no significant difference regarding sales growth. Despite this, the results show significant differences regarding financial performance ROA (0.031), IT overinvestment (0.052), family ownership concentration (0.009), R&D (0.417), leverage (0.050), firm size (0.181) and firm age (0.021) with the highest average in family firms with IT overinvestment.

Table 4.3. Difference in means concerning IT investment deviations

	IT underinvestment (N=7634)		IT overinvestment (N=5043)		t-test (N=12677)	
	mean	se	mean	se	b	se
ROA	0.028	(0.001)	0.058	(0.002)	**-0.031*****	(0.002)
Family ownership	0.879	(0.003)	0.888	(0.003)	**-0.009***	(0.004)
R&D	2.514	(0.014)	2.930	(0.017)	**-0.417*****	(0.022)
Sales growth	0.097	(0.044)	0.094	(0.009)	0.003	(0.055)
Leverage	0.531	(0.003)	0.580	(0.003)	**-0.050*****	(0.004)
FCF	0.029	(0.002)	0.016	(0.000)	**0.013*****	(0.002)
Market value	6.695	(0.017)	6.027	(0.020)	**0.668*****	(0.026)
Firm size	2.368	(0.012)	2.549	(0.015)	**-0.181*****	(0.019)
Firm age	3.129	(0.003)	3.150	(0.003)	**-0.021*****	(0.005)

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

In contrast, there are significant differences concerning IT underinvestment (0.033), FCF (0.013), and the market value (0.668), with a higher average in family firms with IT underinvestment. Therefore, firms with an IT overinvestment tend to have a higher concentration of family ownership, as well as higher outcomes in financial performance and orientation towards greater leverage and investments (R&D and IT).

On the other hand, according to the correlation analysis, the expected results show that the variables of IT overinvestment (0.142), R&D (0.215), market value (0.217), firm size (0.108), and firm age (0.037) are positively related with ROA. Meanwhile, the IT underinvestment (-0.137), family ownership (-0.019), and leverage (-0.216) variables are negatively related to ROA. Sales growth and FCF do not have a significant relationship with ROA.

Table 4.4. Correlation analysis

	1	2	3	4	5	6	7	8	9	10	11
1. ROA	1.000										
2. IT overinvestment	**0.142***	1.000									
3. IT underinvestment	**-0.137***	**-0.345***	1.000								
4. Family ownership	**-0.019***	**0.018***	**-0.042***	1.000							
5. R&D	**0.215***	**0.146***	**-0.214***	**-0.155***	1.000						
6. Sales growth	0.017	0.000	0.009	0.002	0.011	1.000					
7. Leverage	**-0.216***	**0.063***	**-0.088***	-0.015	**0.065***	-0.013	1.000				
8. FCF	0.010	**-0.021***	**0.117***	-0.005	**-0.093***	**0.020***	**-0.195***	1.000			
9. Market value	**0.217***	**-0.193***	**0.230***	**-0.137***	**0.650***	**0.026****	**-0.502***	**0.098***	1.000		
10. Firm size	**0.108***	-0.006	**-0.156***	**-0.151***	**0.701***	**-0.023****	**0.024****	**-0.067***	**0.536***	1.000	
11. Firm age	**0.037***	0.011	**-0.028****	-0.003	-0.015	0.007	**-0.133***	**0.019***	**0.110***	**0.077***	1.000
mean	0.04	0.02	0.02	0.88	2.68	0.10	0.55	0.02	6.43	2.44	3.14
sd	0.12	0.05	0.02	0.24	1.26	3.03	0.23	0.13	1.48	1.04	0.25
median	0.03	0.00	0.01	1.00	2.69	0.00	0.56	0.01	6.49	2.40	3.14
min	-2.17	0.00	0.00	0.00	-4.82	-1.00	0.00	0.00	-0.97	0.69	2.56
max	1.39	1.20	0.10	1.00	7.98	299.34	1.00	6.30	12.96	8.45	4.76

N=12677. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

4.2. GMM analysis

The results are divided into three econometric models. First, using the IT overinvestment variables; second, using the IT underinvestment variables; and third, using simultaneously both IT investment deviation variables.

The results of the econometric models are carried out from three approaches related to family firms. First, as shown at

Table 4.5, we consider the presence or absence of family ownership with the data on unlisted Spanish firms from 2008 to 2018 (24,331 firm-year observations). Second, as shown at Table 4.6, we consider the percentage of participation of unlisted family firms from 2008 to 2018 (12,677 firm-year observations). Third, as shown at 4.7, we consider unlisted family firms from 2008 to 2018 involving a family concentration dummy (greater than 50%) as a robustness analysis. The results are consistent concerning the effects of those variables interacting with financial performance.

Following previous models (Ho et al., 2017), we employ a deviation dummy control variable indicating overinvestment. This variable includes the tendency of unlisted Spanish firms towards overinvestment. Other significant control variables that positively affect financial performance are R&D investment, leverage, market value, and prior performance. On the other hand, firm size negatively affects financial performance.

Regarding IT overinvestment and its relationship to family ownership % participation (model 2) and concentrated family ownership (model 3), independently, each variable shows a negative effect on financial performance. However, when these variables interact (IT overinvestment and family ownership), the combined effects positively affect financial performance. These results confirm the legitimacy challenge behavior that Spanish family firms present to their stakeholders in their industries. ***Therefore, hypothesis H2a is supported***.

Table 4.5. Presence of family ownership on unlisted Spanish firms

	Dependent varibale: ROA		
	(1)	(2)	(3)
IT Overinvestment	-0.185		-0.210
	(-1.57)		(-1.61)
IT Overinvestment x Family Ownership Presence (d)	0.135		0.145
	(1.14)		(1.21)
IT Underinvestment		0.026	0.146
		(0.08)	(0.43)
IT Underinvestment x Family Ownership Presence (d)		-0.003	0.044
		(-0.01)	(0.21)
Control variables			
Dummy indicating overinvestment	**0.026***	**0.020**	**0.025**
	(2.72)	**(2.20)**	**(2.22)**
Family Ownership Presence (d)	0.007	0.011	0.007
	(0.83)	(1.12)	(0.73)
R&D	**0.030***	**0.032***	**0.036***
	(3.36)	**(2.63)**	**(2.92)**
Sales growth	-0.000	-0.000	-0.000
	(-1.27)	(-1.35)	(-1.45)
Leverage	**0.068**	**0.059***	**0.040**
	(2.22)	**(1.67)**	**(1.02)**
FCF	0.002	0.002	0.000
	(0.29)	(0.26)	(0.02)
Market value	**0.021***	**0.021**	**0.014***
	(2.85)	**(2.49)**	**(1.91)**
Firm size	**-0.022***	**-0.022***	**-0.020***
	(-2.81)	**(-2.78)**	**(-2.76)**
Firm age	0.001	0.000	0.002
	(0.13)	(0.00)	(0.18)
ROA	**0.223***	**0.204***	**0.220***
	(4.52)	**(4.09)**	**(4.67)**
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	21883	21883	21883
Number of groups	2755	2755	2755
j	123	123	143
Sargan χ^2	270.91	259.814	295.85
Sargan test of overidentifying restrictions (p-value)[a]	0.000	0.000	0.000
Hansen J χ^2	200.554	197.141	222.664
Hansen J test of overidentifying restrictions (p-value)[b]	0.000	0.000	0.000
Diff-in-Hansen tests of exogeneity (p-value)[c]	0.054	0.002	0.007
AR(1) test (p-value)	0.000	0.000	0.000
AR(2) test (p-value)	0.112	0.179	0.112

All dynamic panel-data estimations are generated by Arellano–Bond two-step difference GMM.

N are non-listed firms from 2008 to 2018. * p<0.1, ** p<0.05, *** p<0.01.

Dependent variable: ROA. All predictor variables in the model are lagged at *t-1* .

Heteroscedastic robust standard errors in parentheses and adjusted for clustering on firm and year.

AR(2) is the Arellano–Bond test of second-order autocorrelation in the errors.

[a] H_0: Not robust, but not weakened by many instruments.

[b] H_0: Robust, but weakened by many instruments.

[c] H_0: Instrumented variables are exogenous.

Table 4.6. % of participation of unlisted Spanish family firms

	Dependent varibale: ROA		
	(1)	(2)	(3)
IT Overinvestment	**-0.337****		**-0.353****
	(-2.17)		**(-2.21)**
IT Overinvestment x Family Ownership %	**0.378*****		**0.386*****
	(2.68)		**(2.63)**
IT Underinvestment		0.039	0.006
		(0.10)	(0.02)
IT Underinvestment x Family Ownership %		-0.175	-0.025
		(-0.50)	(-0.07)
Control variables			
Dummy indicating overinvestment	**0.020***	**0.021****	**0.019***
	(1.87)	**(2.10)**	**(1.90)**
Family Ownership %	**-0.019****	-0.010	**-0.018***
	(-2.26)	(-0.96)	**(-1.74)**
R&D	**0.026*****	**0.023***	**0.028****
	(2.80)	**(1.79)**	**(2.18)**
Sales growth	**-0.000***	**-0.000***	**-0.000***
	(-1.72)	**(-1.66)**	**(-1.86)**
Leverage	**0.090****	**0.074***	0.060
	(2.54)	**(1.95)**	(1.53)
FCF	-0.001	-0.001	-0.002
	(-0.09)	(-0.13)	(-0.18)
Market value	**0.020***	**0.021***	0.017
	(1.78)	**(1.84)**	(1.41)
Firm size	**-0.023***	**-0.023***	**-0.024***
	(-1.75)	**(-1.68)**	**(-1.79)**
Firm age	-0.005	-0.005	-0.004
	(-0.43)	(-0.48)	(-0.41)
ROA	**0.213*****	**0.207*****	**0.211*****
	(5.57)	**(5.55)**	**(5.77)**
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	11676	11676	11676
Number of groups	1722	1722	1722
j	123	123	143
Sargan χ^2	193.001	203.063	234.058
Sargan test of overidentifying restrictions (p-value)[a]	0.000	0.000	0.000
Hansen J χ^2	149.644	151.217	172.302
Hansen J test of overidentifying restrictions (p-value)[b]	0.001	0.000	0.001
Diff-in-Hansen tests of exogeneity (p-value)[c]	0.643	0.108	0.110
AR(1) test (p-value)	0.000	0.000	0.000
AR(2) test (p-value)	0.560	0.630	0.570

All dynamic panel-data estimations are generated by Arellano–Bond two-step difference GMM.

N are non-listed family firms from 2008 to 2018. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Dependent variable: ROA. All predictor variables in the model are lagged at *t-1*.

Heteroscedastic robust standard errors in parentheses and adjusted for clustering on firm and year.

AR(2) is the Arellano–Bond test of second-order autocorrelation in the errors.

[a] H_0: Not robust, but not weakened by many instruments.

[b] H_0: Robust, but weakened by many instruments.

[c] H_0: Instrumented variables are exogenous.

Table 4.7. family concentration (> 50%) of unlisted Spanish family firms

	Dependent varibale: ROA		
	(1)	(2)	(3)
IT Overinvestment	**-0.338****		**-0.314****
	(-2.16)		**(-1.98)**
IT Overinvestment x Family Concentration (d)	**0.334****		**0.317****
	(2.44)		**(2.32)**
IT Underinvestment		-0.019	-0.029
		(-0.05)	(-0.07)
IT Underinvestment x Family Concentration (d)		-0.103	0.001
		(-0.33)	(0.00)
Control variables			
Dummy indicating overinvestment	**0.021***	**0.020****	**0.018***
	(1.91)	**(2.01)**	**(1.74)**
Concentrated Family Ownership (d)	**-0.017****	-0.008	-0.015
	(-2.09)	(-0.80)	(-1.49)
R&D	**0.026*****	**0.024***	**0.027****
	(2.82)	**(1.85)**	**(2.20)**
Sales growth	**-0.000***	**-0.000***	**-0.000***
	(-1.70)	**(-1.66)**	**(-1.85)**
Leverage	**0.088****	**0.074****	0.058
	(2.46)	**(1.97)**	(1.49)
FCF	-0.001	0.000	-0.001
	(-0.11)	(0.01)	(-0.10)
Market value	**0.020***	**0.021***	0.017
	(1.79)	**(1.85)**	(1.41)
Firm size	**-0.023***	**-0.022***	**-0.022***
	(-1.76)	**(-1.65)**	**(-1.78)**
Firm age	-0.006	-0.006	-0.005
	(-0.55)	(-0.53)	(-0.50)
ROA	**0.217*****	**0.203*****	**0.210*****
	(5.72)	**(5.46)**	**(5.67)**
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	11676	11676	11676
Number of groups	1722	1722	1722
j	123	123	143
Sargan χ^2	192.316	209.238	237.619
Sargan test of overidentifying restrictions (p-value)[a]	0.000	0.000	0.000
Hansen J χ^2	147.645	150.599	174.548
Hansen J test of overidentifying restrictions (p-value)[b]	0.001	0.001	0.000
Diff-in-Hansen tests of exogeneity (p-value)[c]	0.660	0.073	0.081
AR(1) test (p-value)	0.000	0.000	0.000
AR(2) test (p-value)	0.550	0.653	0.590

All dynamic panel-data estimations are generated by Arellano–Bond two-step difference GMM.

N are non-listed family firms from 2008 to 2018. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Dependent variable: ROA. All predictor variables in the model are lagged at *t-1* .

Heteroscedastic robust standard errors in parentheses and adjusted for clustering on firm and year.

AR(2) is the Arellano–Bond test of second-order autocorrelation in the errors.

[a] H_0: Not robust, but not weakened by many instruments.

[b] H_0: Robust, but weakened by many instruments.

[c] H_0: Instrumented variables are exogenous.

According to the institutional perspective, family firms' conservative behavior translates into over-investing in IT, compared to the industry average, demonstrating a reduction in the presence of negative outcomes that would confirm a mimetic isomorphism (organizational tendency to imitate the structure of other organizations in its industry) (Powell & DiMaggio, 1991). This trend would be reflected in the "legitimacy challenge" (debatable or moral legitimacy) through close monitoring of the results obtained from the investment by the owners and other investing stakeholders (Greenwood et al., 2017; Suchman, 1995). Indeed, many of these unlisted family firms with concentrated ownership, generally, do not have a brand that is openly recognizable by the market.

However, their actions to reduce their internal and external coordination costs through their IT investments towards their stakeholders will allow a progressive reduction of information asymmetries and a rise in their recognition that legitimize the Spanish family firms. By embracing technology, these firms demonstrate their commitment to modernization and adaptability, which are highly valued by stakeholders and potential investors. The progressive reduction of information asymmetries, combined with improved coordination and efficiency, enhances their market recognition and legitimizes their operations. This increased legitimacy facilitates access to capital, resources, and business opportunities, leading to long-term survival and growth. For these reasons, while the results show that a high level of IT overinvestment and family ownership concentration, considered independently, have negative effects on financial returns, the interaction of family ownership and IT overinvestment shows a reduced negative impact on financial performance. Therefore, organizational legitimacy is essential because it enhances strategic decisions in the high levels of governance structure as family ownership.

Furthermore, family businesses could gain, maintain, or retain legitimacy within the challenges of managing legitimacy. Based on the results, the search to avoid poor performance shows the challenge of preserving pragmatic legitimacy. Spanish unlisted family firms can strategically allocate their IT investments to areas that yield the highest returns and align with their specific business needs. By identifying and investing in IT initiatives that address their unique challenges, such as information sharing, supply chain management, customer relationship management, or data analytics, these firms can optimize the benefits derived from their IT investments. This strategic approach ensures that IT investments are tailored to the firm's goals and contribute to improved financial performance.

In contrast, when we study IT underinvestment and its relationship to family ownership participation (model 2) and concentrated family ownership (model 3) independently, there is no significant effect on financial performance. And, when they interact, there is no significant effect either. Therefore, the hypothesis ***H2b is rejected***.

Figure 4.1. Effects of Concentration Family Ownership

Source: Own elaboration

120
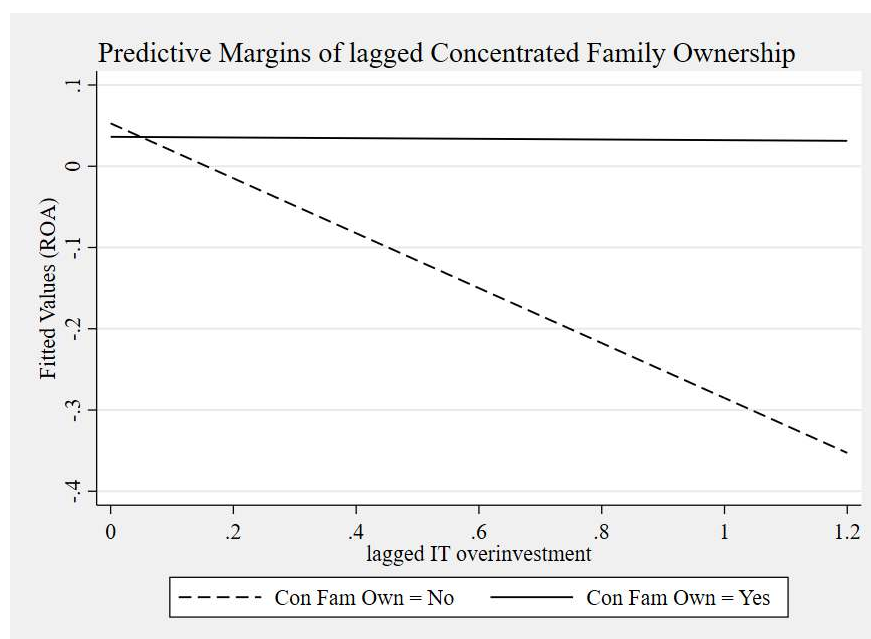
5. Discussion

5.1. Theoretical implications

The theoretical implications of this research focus on expanding the studies of deviations in IT investments under different corporate governance contexts. The literature has not ceased to focus on institutional economics, with agency theory being one of the main perspectives in the prior studies. However, institutional theory and, more specifically, comparative institutional analyses and the perspectives of legitimacy challenges, have allowed this study to refocus the research in new contexts, such as those of unlisted Spanish firms (Gargallo Castel & Galve Górriz, 2017). Under this premise, the study of IT overinvestment and underinvestment is starting to be a relevant field of development in specific countries, and also useful in developing comparative analyses (listed and unlisted firms) under novel institutional heterogeneities (family firm types). In our case, we contribute considering the Spanish unlisted firms with family ownership structures.

5.2. Managerial implications

The practical implications of this research shed light on how to refocus the owners' efforts with technological investments. Although IT capital growth is an ongoing issue in firms, it is evident, considering the findings, that overinvestment is significant for the Spanish case. In the initial stages of overinvestment, firms tend to be risk lovers in this decision. However, when the overinvestment is higher and adversely affects the firm performance, family-owner interaction can positively react to the returns on IT overinvestment deviation. However, family ownership did not directly affect firm performance for these models. This finding must be considered by corporate strategies, showing a challenge of institutional legitimacy played by family owners (and/or concentrated majority owners).

The institutional "legitimacy challenge" can be addressed to some extent by leveraging the reputation and history of the family. Established unlisted family firms often have a track record of success and credibility, which can enhance their legitimacy in the eyes of external stakeholders. By effectively communicating their commitment to IT investments and showcasing the positive outcomes, these firms can leverage their family reputation to gain trust and recognition, mitigating legitimacy concerns.

Unlisted family firms often face the challenge of balancing family dynamics and professional management practices. Managers need to navigate this delicate balance when making IT investment decisions. It is important to establish clear roles and responsibilities, encourage open communication, and leverage external expertise when necessary. By effectively integrating family and professional management, firms can capitalize on the positive effects of concentrated family ownership while ensuring efficient IT investment decision-making.

5.3.   Future research agenda

Future research should thoroughly contemplate the comparative institutional analyses in this field between industrial legal frameworks, or by origin and territorial policies, to determine if this type of institutional environment generates significant differences among firms.

6.   Conclusions

This research studies how the family ownership structure impacts the relationship between IT investment deviations on firm performance. The results show significant differences between family and non-family firms regarding IT investments, IT overinvestment, and IT underinvestment (***H1 is supported***). The results are also encouraging since overinvestment is more likely than underinvestment. In addition, regarding the interaction between family

ownership and IT deviations, the results are significant in the case of IT overinvestment (***H2a is supported***), while the impact of IT underinvestment is not significant (***H2b is rejected***). According to the institutional perspective, the legitimacy challenge by unlisted family firms is confirmed.

The findings support the institutional perspective of the legitimacy challenge faced by unlisted family firms. Unlisted family firms often struggle to establish their legitimacy in the business environment due to factors such as lack of external scrutiny, transparency, and formal governance mechanisms. The results of the study confirm that family ownership impacts the relationship between IT investment deviations and firm performance, highlighting the challenges faced by unlisted family firms in managing their IT investments effectively.

Moreover, the results indicate that IT overinvestment is more likely than IT underinvestment for both family and non-family firms. While overinvestment can result in wasteful spending and inefficiencies, it may also indicate a proactive approach to technology adoption and a desire to stay ahead of the competition. On the other hand, underinvestment in IT can hinder a firm's competitiveness and ability to adapt to technological advancements. Recognizing the prevalence of IT overinvestment suggests that family firms may prioritize maintaining technological relevance as a strategy to mitigate the legitimacy challenge.

To achieve this study, we designed dynamic panel models based on the general method of moments (GMM) with Arellano and Bond adjustment. The models were robust by applying the inclusion of deviations by stages, starting with IT overinvestment, then IT underinvestment, and finally, both deviations in a single model, confirming similar findings.

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